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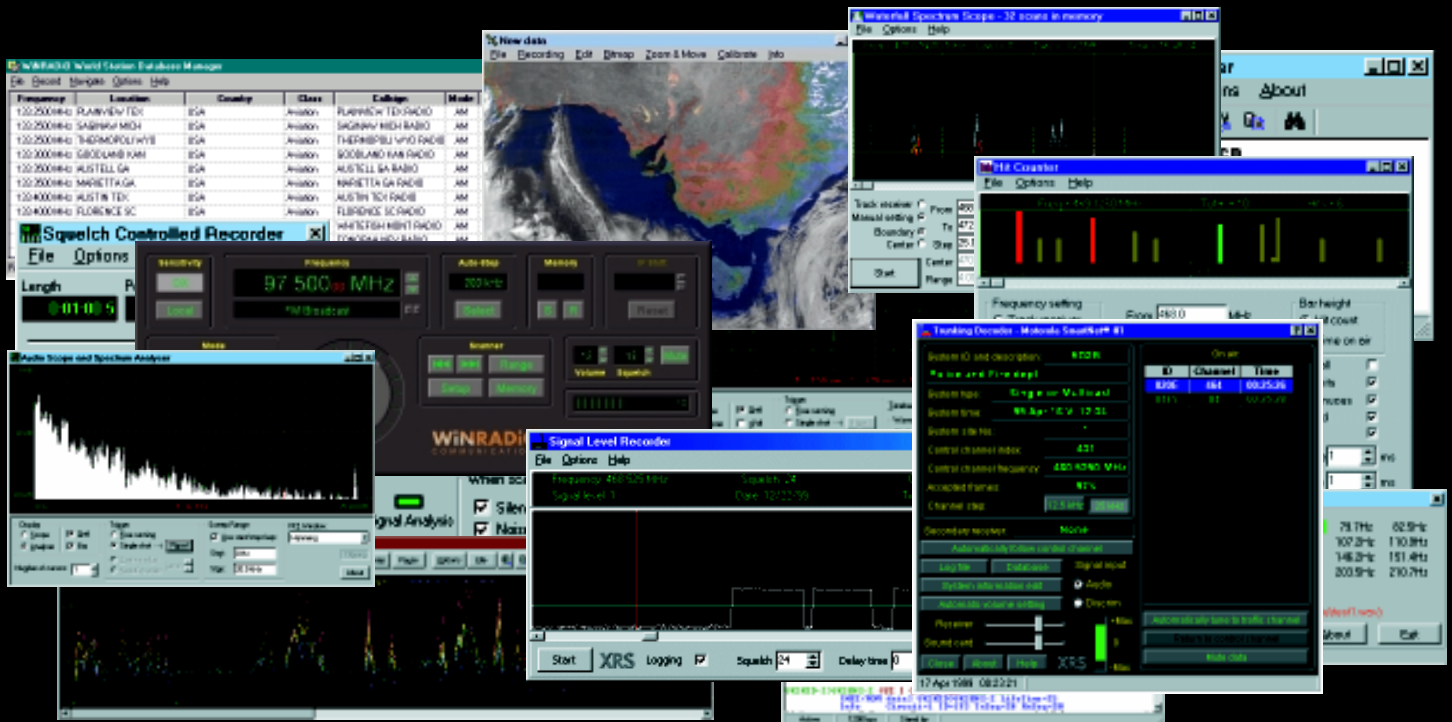
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## Cover Story

### TWR on AM from Bonaire

By Colin Miller

1999 marked 500 years since the first sighting of the Netherlands Antilles island of Bonaire by Amerigo Vespucci. It was also a significant year for Trans World Radio, which had operated the most powerful mediumwave station in the Western Hemisphere from Bonaire.

At the end of 1999, however, a new solid-state transmitter was put into operation which, with four new antennas, will put a more efficient, directional signal into Latin America.

With the sale of the 500 kW transmitter, 800 kHz from Bonaire has just become more of a DX challenge. But give it a try! Story starts on page 10.



Photo by Greig Crogers

*Slave quarters stand as a testimony to Bonaire's past.*

*On our cover: the new antennas and TWR's Bonaire studio building. Photos courtesy Trans World Radio; J Clauss, photographer.*

## C O N T E N T S

### WINB - Surviving on Shortwave..... 14

By Hans Johnson

WINB's charm, says the author, comes from its origin as a chicken house, but its broadcast history is equally unconventional. The oldest commercial shortwave station in America has challenged US policies more than once and faced the dilemma of how to meet the budget while also meeting government criteria.



### How Far is "Line of Sight"? ..... 18

By Michael Scofield

"This scanner's no good; it can't even pick up Franklin only 50 miles away," is a typical complaint we might hear from a local customer in Brasstown. He forgets VHF/UHF signals are considered "line of sight," and there's a substantial mountain in the way.

But just how far *IS* line-of-sight? It's not an idle question in making frequency allocations for air traffic control, because the further above the earth the radio is, the greater the potential for interference from other users of the same frequency.

### Decoding the Russian LEO Navsats..... 22

By John David Corby

In the second half of this series on how to receive and decode the Russian navigation satellites, the author describes how to begin making sense of the signals using your receiver's audio output and two simple computer programs.

### Forbidden Signals from an Ancient Transmitter ..... 25

By Ralph Craig

The author was enjoying his usual Saturday morning monitoring session when it was suddenly interrupted by static so strong it wiped out most of the LF band. QRN5 doesn't adequately indicate the intensity of the signal. To his surprise, the author's direction-finding search pointed straight to his own apartment! As he entered the basement, there sat "Mr. Jones," leaning over a workbench ...



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7540 Highway 64 West,  
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Telephone: (828) 837-9200  
Fax: (828) 837-2216 (24 hours)  
Internet Address: [www.grove-ent.com](http://www.grove-ent.com) or  
e-mail: [mt@grove-ent.com](mailto:mt@grove-ent.com)  
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#### Owners

Bob and Judy Grove  
[judy@grove-ent.com](mailto:judy@grove-ent.com)

#### Publisher

Bob Grove, W8JHD  
[bgrove@grove-ent.com](mailto:bgrove@grove-ent.com)

#### Managing Editor

Rachel Baughn, KE4OPD  
[mteditor@grove-ent.com](mailto:mteditor@grove-ent.com)

#### Assistant Editor

Larry Van Horn, N5FPW

#### Art Director

Bill Grove

#### Advertising Svcs.

Beth Leinbach  
(828) 389-4007  
[beth@grove-ent.com](mailto:beth@grove-ent.com)

## Reviews:

"Don't be put off by the playful appearance and SportCat label," says Parnass. "The SC200 is a serious scanner and a good value." (p.98) If the frustration of shortwave listening and HF amateur radio operating have you wishing for a caped radio crusader, switch in the **MFJ-784B Tunable DSP Filter**. "Does it work? And how!" says Reitz (p.100).

How much difference (be-  
sides price) is there between the  
favorite mediumwave radios for  
DXers: **CCRadio** made by



Sangean for C Crane, and the **GE Superadio**? Bob Grove does a side-  
by-side comparison on p.106.

The AOR AR-8200 handheld  
wideband scanner is powerful but com-  
plicated: can adding computer power  
make it any easier? John Catalano  
tries out three software programs –  
**AR8200 Workshop** (provided with  
the radio), **ARC 8200 Toolbox** from  
BuTel, and **ScanCat SE** from Com-  
puter Aided Technologies (p.94).  
Jock Elliott says the radio hobby in  
general needs organization: the **Palm  
IIIe** personal data organizer comes  
to the rescue (p.96).

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*CCRadio versus GE Superadio*



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# Ham radio license structure and examination process simplified

*"We believe that an individual's ability to demonstrate increased Morse code proficiency is not necessarily indicative of that individual's ability to contribute to the advancement of the radio art. As a result, we find that such a license qualification rule is not in furtherance of the purpose of the amateur service and we do not believe that it continues to serve a regulatory purpose."*

*"...modern communications systems...are based on digital communication technologies, ...no communication system has been designed in many years that depends on hand-keyed telegraphy or the ability to receive messages in Morse code by ear. In contrast, modern communication systems are designed to be automated systems."* Excerpt from Report and Order, WT Docket No. 98-143, Released December 30, 1999.

Not all Amateur Radio operators are pleased with it, but ham radio takes on a new look in the new millennium. In the 1900s, the various Amateur Radio Services of the world were essentially structured based on an applicant's ability to pass higher speed Morse code exams. The faster you could copy code, the more frequency privileges you got. That concept comes to an end as of April 15, 2000.

The requirement that amateur radio operators be proficient in radiotelegraphy is steeped in international history and has been required since the dawn of ham radio. Over the last fifty years, however, the countries comprising the *International Telecommunications Union* have voted to relax the mandatory Morse proficiency requirement at every international conference capable of doing so. The ITU is the worldwide United Nations organization that – among other things – coordinates the global use of radio frequencies.

At a 1947 meeting in Atlantic City, the ITU agreed that Morse proficiency should only be required when amateur operation took place on frequencies below 1000 MHz (1 GHz). At WARC-59, the 1959 *World Administrative Radio Conference* dropped this level to 144 MHz. A further reduction was made at WARC-79 to its present 30 MHz level.

That still means that unless you are code proficient, no amateur radio operator can operate on the worldwide HF ham bands. The ITU does not define what code proficiency involves – only that you have to be able to send code using a hand key and copy it with your ears. Using a computer doesn't qualify, even though it can do it better and faster. Over the years, that manual Morse code requirement has kept hundreds of thousands of people from becoming a ham operator.

It wasn't until 1990 that our FCC adopted a codeless VHF/UHF/Microwave license class. To keep it legal, No-code Technicians were necessarily restricted to operation above 30 MHz.

Why the manual Morse proficiency requirement exists in this automatic digital age is a long story. Like Pogo says, "I have seen the enemy and it is us." In a nutshell, the *American Radio Relay League* – the large U.S. ham society – is the lead organization in the *International Amateur Radio Union* (IARU). The IARU, made up of various national societies from around the world, is officially recognized as the worldwide Amateur Radio spokesman before the ITU. And since most long-term ham operators are Morse proficient, most of the national organizations have taken the position that all ham operators should be so skilled. Over the decades, the IARU and the ARRL have fought tooth-and-nail to keep the manual Morse requirement in ham radio.

Three Morse code exam speeds currently exist in amateur radio: 5, 13

and 20 words-per-minute. The faster you can copy code, the higher up the ham radio ladder you climb. Up until 1990, waivers of the 13 and 20 wpm Morse code speed requirement were not possible. But with the help of King Hussein/JY1 of Jordan and President George Bush, exemptions for the handicapped were finally obtained, allowing amateurs with learning, mental or physical handicaps to qualify for a complete waiver of the 13 and 20 wpm Morse examination.

Over the past decade, hundreds – and probably thousands – of radioamateurs have used the *Physician's Certification of Disability* route to upgrade. While most of these exemptions are legitimate, there is a widespread feeling that many may be fraudulent. It appears that many doctors, with no knowledge of radiotelegraphy, may be assisting their patients by signing the waiver. Both the medical profession and the amateur community seem to have their own definition of a disabling handicap.

## Background

The FCC's intention to restructure the Amateur Service is based on three *Petitions for Rulemaking* filed by the American Radio Relay League in 1996 and 1997. One of them, filed September 23, 1997, wanted the FCC to require handicapped amateurs with doctor-certified disabilities to be required to attempt the CW test – with any necessary accommodations – before being granted an exam waiver based on a physician's certification.

In addition, ARRL wanted a rule amendment that would require Volunteer Examiner Coordinators (VECs) to obtain and review medical history pertinent to an applicant's handicap from the certifying physician. The medical information would be required to be in the VEC's files before the license upgrade application could be forwarded to the FCC for processing. This last part was very controversial. VECs doubted some doctors would submit the records, felt they were not qualified to interpret medical information even if they got it, and generally felt a patient had a right to keep personal medical information confidential.

A few months after the petition was filed, the FCC told the ARRL leadership that it was considering reducing the telegraphy requirement to 5 words per minute for everyone as a way to eliminate the necessity to issue code waivers to anyone. The ARRL came away from that meeting believing that Amateur Radio was indeed headed for a 5 wpm code speed.

At their next Board meeting, the ARRL directors voted to recommend restructuring of the Amateur Service – an item that was not on their agenda. The majority of the Board decided to go with a simplified four-license class plan instead of the current six (Novice, Technician, Tech Plus, General, Advanced and the top-of-the-line Amateur Extra Class).

## The ARRL restructuring proposal

The ARRL initially wanted the four-class structure named Class A, B, C, and D. Later they would revert back to the current names: Extra, Advanced, General and Technician Class. In addition, the League suggested that more voice privileges should be accorded to the highest three classes. The additional frequencies would come from "refarming" the Novice CW bands which would no longer be needed.



Instead of three code exam speeds, the ARRL asked for only two ...5 wpm for the General and 12 wpm for the Extra Class. Where the Morse code requirement was to be decreased, the ARRL wanted a corresponding increase in the difficulty of the written examination.

A formal letter to the FCC Commissioners proposing the new four class was delivered to the FCC on July 22, 1998.

## The FCC decision

The FCC released the amateur restructuring *Notice of Proposed Rulemaking* on August 10, 1998. It basically proposed the ARRL plan – that is, to reduce the number of license classes in the Amateur Service from 6 to 4. In addition, FCC wanted the public to comment on any needed changes to the telegraphy and written examinations that had to be passed to qualify for the various Amateur Radio licenses.

The National Conference of VECs – the umbrella group made up of members from all the Volunteer Examiner Coordinator organizations – suggested that only three license classes should remain out of the six. Novice and Advanced Class amateurs would be “grandfathered” – that is, they would be able to renew their licenses, but no new Novice and Advanced Class tickets would be issued.

They agreed that the Technician Plus Class could be renewed as Technician, but would still retain their 5 wpm code credit indefinitely. The NCVEC said that “...except for the interna-

tional *Radio Regulation* requirement (Article S25.5), there is no longer any public interest served by requiring code testing.” But recognizing that treaty obligation, suggested a maximum Morse code examination speed of 5 wpm.

On December 30, 1999 – the last government working day of the old century, the Federal Communications Commission adopted the NCVEC proposal – that is: three license classes with 5 wpm being the top exam speed. The single 5-wpm code speed also means the end of the controversial physician certification waivers of the higher speed telegraphy examinations.

Effective April 15<sup>th</sup>, applicants will only be able to apply for three license classes: Technician – the VHF/UHF entry level; General – the HF entry level; and Extra – a technically-oriented senior ticket. The Technician Class continues as a “no code” ticket. No new Novice, Tech Plus or Advanced Class licenses will be issued after April 15<sup>th</sup>.

With one exception, the FCC elected not to increase the operating privileges of any license class. This means that all licensees will retain their current operating privileges including existing Novice, Tech Plus and Advanced class operators who will remain in the FCC database. No one is being forced to upgrade their license ...and no one loses any privileges if they don't. Technician class operators who were licensed before March 21, 1987, are actually the only ones that gain privileges. That's because the

FCC split the Technician Element 3 into 3A and 3B effective that date. The old Element 3 contained HF-oriented General Class questions. These so-called “Old Techs” merely have to go to a VE test session after April 15<sup>th</sup> with evidence of their status, pay a \$6.65 application fee and they will be upgraded to the General Class without further examination.

## Summary of the changes

- 1) allow current Amateur Radio Service licensees to contribute more to the advancement of the radio art;
- 2) reduce the administrative costs that we incur in regulating this service and streamline our licensing processes;
- 3) eliminate unnecessary requirements that may discourage or limit individuals from becoming trained operators, technicians, and electronic experts; and
- 4) promote efficient use of spectrum allocated to the Amateur Radio Service.

So, effective April 15<sup>th</sup>, the U.S. ham radio takes on a new look. Only three license classes will continue to be issued: Technician, General and Extra ...conferred by three written examinations and one 5 wpm code exam speed. New Element 2, 3 and 4 study manuals should be available shortly. The new rules should make ham radio – especially access to the worldwide high frequencies – easier for all concerned. See you on the ham bands.

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## New Question Pool Available

In preparation for the amateur radio restructuring rules which take effect April 15, 2000, a revised amateur radio question pool was expected to be made public by February 1 or "very shortly thereafter," according to Chairman Ray Adams, W4CPA, of the National Conference of Volunteer Examiner Coordinators' Question Pool Committee.

See Washington Whispers, the Beginner's Corner, On the Ham Bands, and Closing Comments for more on this momentous Dec 31st ruling on ham radio by the Federal Communications Commission.

## FCC Rules on Low Power Stations

The Federal Communications Commission ruled January 20th to issue at least 1,000 non-commercial, low-power FM licenses across the country. The FCC's move will allow churches, non-profits and community groups to get licenses for inexpensive, non-commercial FM stations.

By May, the FCC is to begin awarding licenses to applicants interested in running 10- and 100-watt stations. This level of power will allow operators to reach audiences within a 1-mile radius for 10-watt stations and a 3 1/2-mile radius for 100-watt stations. The FCC stopped licensing such stations in 1978.

FCC Chairman William Kennard began lobbying for low-power radio nearly two years ago. "This is all about bringing new voices to the airwaves," he says.

The FCC has heard from hundreds of potential applicants, including ethnic and religious groups and the Port Authority of New York and New Jersey, which wants to beam traffic reports. Musicians led by Jackson Browne and the Indigo Girls say low-power radio will give outlets to local artists. Kevin McGaughey, principal of Brookland High School in Arkansas, says its station would employ students and broadcast local news, sports and weather.

For years commercial broadcasters have opposed the plan, fearing that low-power stations would interfere with existing channels. "Every legitimate scientific study validates that additional interference will result from low-power FM," said Edward Fritts, president and chief executive officer of the National Association of Broadcasters.

But rules will require that new stations be at least three dial clicks away from existing broadcasters. Radio tests following this rule have exceeded FCC criteria, officials said.

## Radio with Pictures

It seems a group in Anchorage, Alaska, found an interesting loophole that already permits LPFM operations in certain situations. To be specific, KZND-LP, a low-power TV station authorized to broadcast on channel 6, has been operating as a FM "radio" outlet, "87.7 The End" (visit [www.kznd.com](http://www.kznd.com) and click on "What's Up" for more information)

Originally, the station was carrying only an audio carrier until they received a notice from the FCC claiming that such broadcasts were illegal—at which point a video signal (a camera panning across printouts of the text of public service announcements) was added.

The sound carrier of TV channel 6 is 87.75 MHz, a frequency that can be tuned on many FM radios. Full-power channel 6 stations (including WPSD-TV Paducah, Kentucky, and KBJR-TV Superior, Wisconsin) have been known to promote this ability, but only as an added feature to their television broadcasts.

-Doug Smith

## Vacated TV channels to be auctioned

Three years ago, Congress gave television stations until 2006 to convert to digital broadcasting, and channels 60-69 are to be released back to the FCC as the transition takes place. Twenty-four of the 60 megahertz to become available is reserved for law enforcement, but who will get the other 36 megahertz has been a subject of fierce debate.

The FCC recently adopted the rules that will govern the spectrum which is due to be auctioned this spring.

The FCC established two license bands, one of 20 MHz (two paired 10 MHz bands) and one of 10 MHz (two paired 5 MHz bands) that can be used for a variety of wireless services. These spectrum blocks can potentially be used for advanced wireless services, such as high-speed Internet access and next generation (3G) broadband wireless services, as well as new broadcasting services that meet the applicable technical parameters.

Still at issue, because of interference concerns, are 6 MHz of airspace near the law enforcement allocation. Motorola has lobbied for the spectrum to be used for walkie-talkies and other low-power communications; another company is requesting the space be reserved for narrowband voice and internet data. The FCC has agreed to study the issue further.



(See [www.grove-ent.com/hmpgmt.html](http://www.grove-ent.com/hmpgmt.html) for more events and club info)

### Mar 10-11: Kulpsville, PA

The Winter SWL Festival, at the Lansdale-Kulpsville Holiday Inn (215-368-3800) is a gathering of radio hobbyists, DC to daylight. Winterfest is now sponsored by the North American SW Association (NASWA) and organized this year by Richard Cuff and John Figliozzi. For a PDF format registration form and program schedule go to [www.trsc.com/winterfest.html](http://www.trsc.com/winterfest.html). The Web page includes a map, hotel information, airport shuttles and more.

### Mar 1-8: Clipperton DXpedition

N7CQQ Amateur Radio Club, Inc. DXpedition to Clipperton Island, sponsored by ICOM America. Operating four (4) HF stations, one (1) 6 Meter station and one (1) satellite station. Also plan RTTY and the WARC bands. Additional info [www.qsl.net/clipperton2000](http://www.qsl.net/clipperton2000)

### March 11, 18, 25, April 1: St. Louis County, MO

Four all-day Severe Weather Observation seminars planned at various locations around St. Louis County. SKYWARN Level 1 training in the morning, SKYWARN level 2 in afternoon. Call the information line 314-615-7857 for a recorded message and locations. Training is free of charge and open to everyone.

### March 12: Waukesha, WI

SEWFARs ARC hamfest - Call 414-835-7035 for details.

### Mar 18-19: Midland, TX

Midland ARC annual St. Patrick's Day Hamfest at the Midland County Exhibit Building 8-5 pm Sat, 8-2 pm Sun. Huge inside flea market, dealers, tailgate area, T-hunts, concession with hot meals. V.E. exams 1 pm Saturday. Admission \$8. Contact Midland ARC at P.O. Box 4401, Midland, TX 79704, or Larry Nix, N5TQU, [oilman@lx.net](mailto:oilman@lx.net). Flyer on-line at [www.w5qgg.org](http://www.w5qgg.org).

## E-NEWS:

The Ontario DX Association has started an e-mail group for hobbyists. To join, send a blank e-mail to [odxa-subscribe@eGroups.com](mailto:odxa-subscribe@eGroups.com). You do not have to be an ODXA member to participate.



## Emergency Beacons to be Phased Out

The International Cospas-Sarsat Program announced it will terminate satellite processing of 121.5/243 MHz ELTs and EPIRBs.

Cospas-Sarsat operates a satellite constellation that relays distress alerts to search and rescue authorities through a worldwide ground communications network. The appropriate search and rescue agencies then respond to provide assistance. The beacons used include emergency locator transmitters (ELTs) in aircraft, emergency position-indicating radio beacons (EPIRBs) carried on board vessels, and personal locator beacons (PLBs) used by individuals.

Mariners, aviators and other persons will have to switch to emergency beacons operating at 406 MHz in order to be detected by satellites.

While no effective date has been set yet for this action, it is expected to occur far enough into the future to avoid a crisis situation for persons now using these beacons.

False alerts on 121.5 MHz inundate search and rescue authorities. While the 406 MHz beacons cost more, they provide search and rescue agencies with the more reliable and complete information they need to do their job more efficiently and effectively.

## FCC Gets Its Man

For three months police in Los Angeles were plagued by a recorded harangue against the police and transit authorities which was picked up by their handheld radios. "While the message was playing we could not use our radios to communicate from one officer to another," said Detective David Flores, of the California Highway Patrol.

The FCC's investigation began after Los Angeles-area police departments and other licensees filed complaints with the Commission over intentional interference on their frequencies.

The FCC's field office succeeded in locating the source of the transmissions and observed anti-government activist Jack Gerritsen of Bell, California, as he operated a handheld wireless device.

Gerritsen was arrested and accused of violating sections of the California Penal Code, which prohibits intercepting, obstructing and interfering with police radio communications. He also allegedly violated parts of the federal Communications Act of 1934 that deal with interference, according to an official from the FCC's Enforcement Bureau.

## Carol Ruth, Editor in Chief, RCMA Journal

We regret having to report the passing of Carol Ruth of Silverado, Colorado, Editor in Chief of the former *RCMA Journal*. After a

valiant battle with lung cancer, Carol passed away on January 10, 2000. Those of us who wrote for, or subscribed to, the *RCMA Journal* during its heyday will recall the professionalism and friendliness extended by Carol from her home to all who were in contact with her.

The Staff and friends of *MT* extend our

deepest sympathy to her husband Monty and family during their time of bereavement.

## Geoff Perry, Dead at 72

The death has been announced of Geoff Perry MBE, founder of the Kettering Group, and co-discoverer of the Plesetsk launchsite in 1966. He was 72. January 18 he died following a heart attack which struck without warning.

Perry was a physics teacher who, during the 1960s and 70s, uncovered secrets of the Soviet space program using inexpensive short-wave equipment and an army of students from the Kettering Grammar School.

Jonathan McDowell, a Harvard astrophysicist who also publishes Jonathan's Space Report, said of Perry, "He showed you could compete with the CIA using the cheapest equipment and a class full of high school students." Perry's work has been an inspiration to many, including John David Corby, author of this month's feature article on decoding the Russian satellites using the tools at hand.

Geoff Perry took a job as space analyst for

Britain's ITN television network, following his retirement from Kettering. Lawrence Harris, editor of "View from Above," will include an appreciation of Geoff's work in his column next month.

**"Communications" is compiled by Rachel Baughn** (mteditor@grove-ent.com) from news clipped out and sent in or emailed by our readers. Thanks to this month's reporters: Anonymous, NH, NJ, and NY; Norman Hill, Arlington, VA; David Carberry, Gales Ferry, CT; Ullis Fleming, Glen Burnie, MD; Ken Hydeman, Xenia, OH; Gerald Kercher, Quaker Hill, CT; Bill Mauldin, NC; Doug Robertson, Oxnard, CA; Kevin Klein, Neenah, WI; and these folks via email: Robert Felton, Lawrence Harris, Maryanne Kehoe, Marcel, Fred Moore, Haskell Moore, Ira Paul, M Peraaho, Laura Quarantiello, Ken Reitz, Doug Smith, Tom Sundstrom, Larry Van Horn, Robert Wyman, David Zantow.


### Memorable Quote :

The FCC, reinforcing its pronouncement made in the Codeless Technician Decision:


*"We do not concur... that the passing of a telegraphy examination is an indication of the examinee's good character, high intelligence, cooperative demeanor, or willingness to comply with our rules. These traits are also found in individuals who have not passed a telegraphy examination rather than being exclusive to those who have passed such a test."*



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# TWR ON AM FROM BONAIRE

by Colin Miller, Sarnia, Ontario,  
Canada



**"Bon Bini!"** That's the local Papiamentu welcome you will receive if you visit Bonaire, one of the so-called A-B-C islands in the Netherlands Antilles. Beautiful, tranquil Bonaire – with acres of driftwood, crystal-clear waters, and a paradise for windsurfers, snorkelers and scuba divers! And it's also the site of the largest flamingo sanctuary in the Western Hemisphere.

Bonaire lies 50 miles to the north of Ven-

ezuela, 30 miles off the East Coast of Curaçao, 86 miles east of Aruba and about 1,720 miles from New York.

The first inhabitants were the Caiquetios (a branch of the Arawak Indians) who sailed from Venezuela about 1,000 years ago. The name "Bonaire" may have originated from the Caiquetio word bonay, meaning "low country." After the Spanish conquest, most of the population was sent as slaves to work on the sugar plantations on the island of Hispaniola.

In 1633 the Dutch took possession of the A-B-C islands. Curaçao became the center of a thriving slave trade. African slaves were imported to Bonaire to work in cutting dye-wood, as well as the cultivation of maize (corn) and harvesting the salt ponds. You can still see reminders of these repressive times in the form of slave huts on the island.

Last year marked the 500th anniversary of the first sighting of the island by explorer Amerigo Vespucci. 1999 marked the beginning of a new era in the history of Bonaire, as well as for Christian broadcaster Trans World Radio.

For the past 36 years, Bonaire has been the site of the most powerful medium wave station in the Western Hemisphere. The maximum power allowed in the US is 50,000 watts, but at its inception TWR installed a

giant Continental Electronics 500,000-watt unit. A transmitter of similar power, built by the Swiss Brown Boveri Company, replaced this in 1987. TWR purchased this unit from Capital Radio, a Top-40 station in the former Transkei homeland of South Africa.

Let's take a look back over the years at some of the history behind the Bonaire station.

## The Early Years

When the late Dr. Paul Freed first dreamed of broadcasting the Gospel to South America, there were no absolutes. Only questions. Where should he build the station? Where would the money and expertise come from? How could he staff a second radio station? At that time they were broadcasting from Monte Carlo on the European Riviera. The hurdles seemed insurmountable.

But Paul Freed was a daring man with a deep faith. He dared to believe that the same God who had provided the resources to build the Voice of Tangier in 1954 and later, TWR Monte Carlo, could also provide the means to reach Latin America by radio. Thus began a chain of events that had many links.

While visiting Monte Carlo after having considered Puerto Rico as a possible site, Dr. Freed called a friend at the Philips Company in Holland to try to arrange an appointment



*Donkeys in the antenna field; these animals are a common sight on the island.*



with a representative from the Netherlands Antilles. He then flew to The Hague and when he called the representative, was informed that the Minister of Culture and Education, Mr. J.C. Debrot, was in Holland at that time. Later that day the two men discussed at length the possibilities and advantages to the Antilles in establishing a high-powered radio station. Mr. Debrot was enthusiastic about the project.

Ten days later, Dr. Freed was invited to travel to Curaçao to attend a preliminary conference about setting up a station. The ministers were very helpful, and suggested that he continue to discuss the technical aspects with Mr. R.H. van Haaren, head of the Department of PTT. Within a week of Dr. Freed's arrival, a permit was drawn up that would allow TWR to:

- \* choose any workable frequency on the AM dial
- \* go up to half a million watts of power
- \* build any number of shortwave transmitters of any amount of power
- \* use any reasonable number of frequencies
- \* receive free from the local government a piece of property 10 miles out of Willemstad to be used as the station site
- \* use channel 2 for a TV station at any time in the future

Never before in the history of broadcasting had a private group of any kind been granted such a permit.

All these were important links in a remarkable chain of events.

### Curaçao or Bonaire?

Trans World Radio had originally planned to build the new station on Curaçao. But problems arose with the project site. TWR and government engineers, looking into the intricacies of a super-power station, started to worry that the site would be located too close to the airport on the island. The government suggested the neighboring island of Bonaire as an alternate location.

What a change from the hustle and bustle of Curaçao! Quiet, unpretentious Bonaire – it seemed an unlikely spot for the most powerful medium wave station in the Western Hemisphere. But soon engineers found that Bonaire was an excellent choice technically. The large salt flats would provide unbelievable conductivity, vital to long-range, high-power broadcasting. Many experts said that the move to Bonaire would effectively double the station's power. And so, relocation be-

gan. The officials of Curaçao were gracious in releasing TWR from their permit with them at no cost to the station.

The people of Bonaire warmly welcomed the TWR staff. Lt. Governor E. J. Markos and his council granted a square mile of land outside Kralendijk, the capital, plus an excellent piece of property in the center of town. They also helped work out the many logistical details of building the station on their island. They would pave the roads and install ten phone lines between the studios and transmitter site. They planned to clear the land free of charge and put in landscaping and parking lots at both sites, and deliver all

the workmen, that one crew gave up and walked off the job. Continental, looking for a harder group of men, came up with a crew that had just finished a project in the Orient. With better equipment and experience, they were able to complete the job.

Bill Mial, TWR-Bonaire's first station director, recalls...

"Memories of the early days bring back moments of excitement, anxiety and frustration. Arc welding was a miserable task in the hot Bonaire sun with no shelter and a mask with a glass window. We consumed eye drops, Solarcaine and iced tea in prodigious amounts!

"Then the creosote-soaked telephone poles arrived for the antenna switchbay. Their powerful odor made one of our men faint.

"Most memorable, however, are the people. A spirit of unity, excitement and enthusiasm made a handful of people cinch their belts and determine, with God's help, to get the job done even when they were working in areas far removed from their specialties."

### Which frequency?

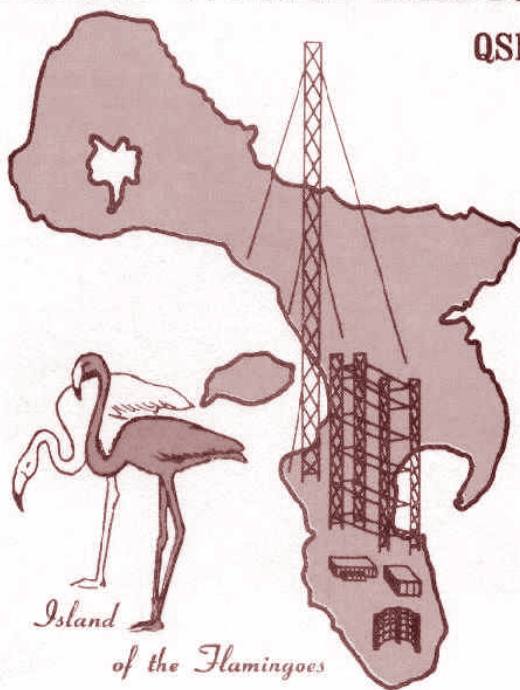
As the time drew near for the start of broadcasting, Dr. Freed was bothered by a serious problem. In the early stages of the project, a frequency had to be selected, as this would determine the specifications of the transmitter and tower. TWR had the choice of any channel that would not cause severe interference to other stations. After a close study, the choice was narrowed down. It was felt that 800 kHz was the best choice for two reasons. Firstly, there are at least three times as many people tuning to a spot in the middle of the dial than at either end. And second, there is no station in the United States broadcasting on the 800 kHz spot after sundown.

But there was a major problem. In Maracaibo, Venezuela's second-largest city, only 150 miles away, there was a strong local station called Ecos del Zulia, broadcasting with 25,000 watts on 800 kHz. TWR was aware of this. They also realized that there was a friendly relationship between Venezuela and the Netherlands Antilles, as well as between Venezuela and the United States. But there was no doubt in Dr. Freed's mind that this was the frequency to use. Then the unexpected happened. In his book *Towers To Eternity*\*, Dr. Freed comments:

\*A complimentary copy of the book *Towers To Eternity*, a fascinating account about the history of TWR, is available from the station's national headquarters at P.O. Box 8700, Cary, NC 27512-8700.

## TRANS WORLD RADIO

QSL



## BONAIRE, NETHERLANDS ANTILLES

*QSL card showing map of the island, antennas and flamingo.*

the coral rock that TWR would need. They promised to bring all the radio equipment into the country duty-free. Finally, the government guaranteed to provide a loan on all the buildings.

Construction began in September 1963. The transmitter and diesel buildings were the first on schedule. A crew from Continental began putting in bases and feeder lines for the antennas. But the 760 foot AM tower caused many problems. At a couple of hundred feet, the easterly trade winds often blow fiercely across the island, at 50 to 60 knots. This created such an intolerable situation for

"After the transmitters were installed – with only two weeks remaining until we would go booming down the entire length of the South American continent – something happened that we still find difficult to believe. All of a sudden we realized we were not picking up a signal anymore from Maracaibo. We thought some breakdown must have silenced them temporarily. But after several days of no broadcasting we investigated and discovered that the Maracaibo station had gone bankrupt and was off the air permanently!"

Because the station had left a vacant spot, TWR was able to move into a ready audience,



**On-air on Bonaire - one of the 800AM announcers.**

with fantastic results when it began regular broadcasting on August 13, 1964. Response was immediate and overwhelming. Nearly 3,700 letters from 79 countries poured in during the first two months the station was on the air.

### TWR Bonaire today

On April 14, 1997, TWR inaugurated a 50,000-watt Omnitronix transmitter to be used for an expanded English broadcast schedule to the Caribbean on 800 kHz during local daylight hours when the 500,000-watt transmitter was off the air. The high-powered transmitter continued to carry the overnight transmissions in Portuguese, Spanish and English.

In order to cut down on the heavy electricity costs in running such high power on the AM band, a new Canadian-built Nautel NA-100 transmitter of 100,000 watts has been installed. Four 480-ft antenna towers are being erected. These will replace the existing five towers. The transmitter is already up and running, and work on the towers was completed by the end of 1999.

With lower power, will this result in a smaller coverage area? In terms of primary "desired" coverage, there won't be much difference – largely due to the more directional capabilities of the antenna array. If you're doing a simple land-area comparison of the footprint, yes – it's a fair bit smaller.

TWR tends to define "coverage" not just by where the pattern may extend, but also by whom the desired audience is. This new system will provide a clearer and more pow-

erful signal into the northern Caribbean, including Cuba, and into South America, in particular the vast Amazon Basin. The new transmitter has some signal processing capabilities the older 500,000-watt unit didn't – all solid state.

### ALAS and CGN

Local stations fed by satellite can now reach a number of people who used to depend exclusively on the 500,000-watt transmitter. Over the past 36 years the population of Latin America has grown significantly. More and more megacities have been formed, and this has, of course, caused an increase in the number of radio stations on the AM band. This, in turn, has resulted in a reduction in the coverage area of the 800 kHz signal.

A few years ago, after reviewing the situation, TWR and HCJB engineers embarked on a number of projects involving satellite technology. The first of these was the ALAS network, serving Latin America in Spanish.

Then on May 18, 1999, the official inauguration of the Caribbean Gospel Network (CGN) took place. About 50 people from radio stations throughout the Caribbean went to Bonaire to attend this event, and many participated in a 2-day radio production seminar that followed.

There's the potential of reaching 6.2 million new listeners with these specifically Caribbean-related Gospel programs. A satellite dish is required in order to receive the CGN signal, and 12 stations are now part of the network. The individual stations can join or leave the network in accordance with their program schedule. CGN is basically a relay of the medium wave program.

### The Future

It was recently announced on Bonaire that there are going to be major changes to the ministry from the island. As just mentioned, CGN was launched last year to more effectively reach the people of the Caribbean islands of Haiti, Dominican Republic, Cuba, West Indies, etc. There are over a dozen local radio stations on the islands downlinking TWR programs from the satellite.

These stations are asking that in order to be more effective in reaching their people with the Gospel, it needs to be done by people from the islands who know the culture and



**ALAS and CGN uplink dishes.**



***The new solid-state 100 kW transmitter and directional antennas are more efficient at getting the signal into Latin America, but reception in North America will become a challenge.***

context. The best resource for all of these cultures is in the Miami area of south Florida. So the decision has been made to move the CGN by September 2000.

There are many positive reasons to make the move, but it is going to be a traumatic change to the staff and operation on Bonaire. There are presently 28 missionary families on Bonaire. After the transition there will only be four or five. This is going to be hard on those who have been missionaries much of their lives on this little island. Ultimately the only broadcasts originating from TWR Bonaire will likely be in Spanish and Portuguese, with English coming from Miami via satellite.

### Conclusion

TWR Bonaire currently broadcasts in English, Spanish and Portuguese. There are also plans to broadcast in Creole in the future.

For many years TWR Bonaire also used shortwave, with broadcasts to the Americas and Europe in several languages, but this service was terminated at the end of June 1993. The island is an easy SW catch via the Radio Netherlands relay station, but the 800 kHz outlet is much more of a challenge for DXers in the northern US and Canada. This is especially so for me, as CKLW Windsor dominates the channel here in southwestern Ontario. But give it a try!

*CM*

*Acknowledgements to Bill Damick and Bob Thorp for their valuable assistance. Also to Greta Craggs, a friend who recently returned from a short-term missions trip with TWR, for the photos.*

### About the Author

Colin Miller has been a keen DXer since the mid 1950s, while living in South Africa. From 1982 to 1986 he worked at the former Radio RSA, where he was in charge of their Monitoring Panel. He now lives in Sarnia, Ontario.



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# WINB - Surviving on Shortwave



*If not for the dishes and the wall built to prevent interference, this could be a rural Pennsylvania homestead instead of the oldest commercial shortwave station in the U.S.*

*An American shortwave station airs controversial programming and is investigated by the FCC. Sounds like something from after the Oklahoma City bomb explosion, right?*

*No, it is WINB back in 1963. Broadcasting from the hills of south-central Pennsylvania, WINB has a history full of surprises. Read on for the story of America's oldest commercial shortwave station.*

by Hans Johnson

**W**INB was born in the York, Pennsylvania, hospital in 1957. John Norris Sr, then running AM station WGCN in nearby Red Lion, was in the hospital after a heart attack.

Reverend Ralph Neighbor came by to see how he was doing. During their conversation, Neighbor suggested that Norris add shortwave. Norris had no idea how he would get on shortwave, but he agreed to try.

Norris initially wanted to broadcast to the Soviet Union, but the Federal Communications Commission (FCC) turned him down, claiming that there were no frequencies available. In these post-Sputnik years of the late 1950s, the United States was in a cold war with the Soviet Union on many fronts – including radio.

What the FCC wasn't telling Norris was that the Voice of America (VOA) was using all of the available frequencies. This gave the VOA a de facto America monopoly on broadcasts to the Soviet Union – seemingly a violation of the Smith-Mundt Act of

1948, which forbade a government monopoly in shortwave broadcasting.

Norris did not know about this, so he set his sights on North Africa and Southern Europe instead. The FCC still asked Norris to clarify his programming objectives, which he did:

*[The] applicant's overall objective is to present the points of views and attitudes on questions of international significance which fairly reflect the position of the United States.*

Norris also promised that his proposed station would be “guided by Voice of America policies and programming.” The section that was guiding the FCC as they asked these questions of Norris indicated that a station transmitting on shortwave could –

*render only an international broadcast service which will reflect the culture of this country and which will promote international goodwill, understanding, and cooperation.*

The rule was too controversial when it was originally proposed, and American stations of that era complained of censorship. The FCC quickly dropped the rule only to quietly reinstate it in 1955. Now WINB was about to smack right into it.

Norris also had a strong desire to spread the gospel, but he did decide on a commercial license for his station. Satisfied for the moment, the FCC issued Norris a construction permit in 1960.

A young Fred Wise, who became the station's engineer, built the transmitter site and studio for the new WINB (“World in Need



of the Bible”) from a chicken house. Having wooden floors and high ceilings with lots of windows, WINB has a charm that often eludes more modern stations, which can seem rather sterile.

Wise also built a rhombic antenna in a small valley near the studios. Transmissions started two years later with a single 50 kW transmitter, a Continental 417B. Wise went to school at Continental’s offices in Dallas to learn its operation. WINB continues to operate this same transmitter today.

### The second challenge

WINB operated for just a few months when the FCC launched an inquiry into its programming. Specifically, the FCC was looking at the *Twentieth Century Reformation Hour*, a program presented by the Rev. Carl McIntire of Collingswood, New Jersey. The parent body of the VOA, the United States Information Agency, lodged a complaint after hearing McIntire question the usefulness of the United Nations, a statement at odds with American foreign policy. The FCC then followed up on the VOA complaint.

McIntire was a right-wing fundamentalist, given to making controversial statements. A piece by Jack Gould, then radio and

TV editor of the *New York Times*, brought the matter into the open in January 1963. Gould asked:

- Was WINB projecting an accurate picture of the United States to its overseas listeners?
- What chance was there that overseas listeners would think that its programs represented official American policy?

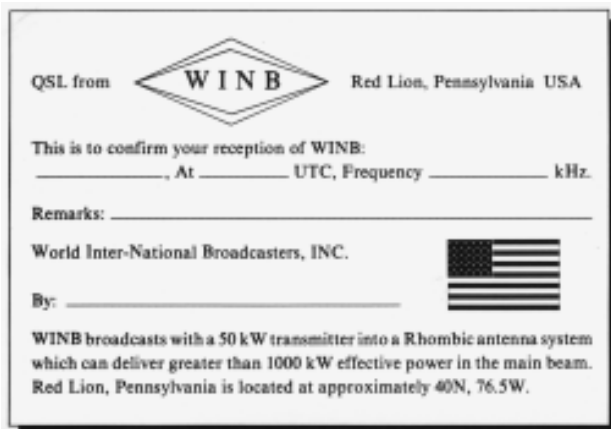
FCC Chairman Minow agreed and said that an inquiry had started because of governmental apprehensions that foreign listeners might be misled as to American policy.

Gould answered his second question. Most other countries do not have private broadcasting. Listeners often believed that any station heard on the radio was a government one and hence WINB must have official sanction. Yet WINB only had a single transmitter that was on the air for only five hours a day at this time. VOA was on scores of frequencies in dozens of languages around the clock. WINB could hardly be considered competition for presenting a

picture of American society.

Gould did not answer his first question, perhaps because it was impossible to do so.

McIntire responded a few weeks after the Gould article with a broadcast in which he said, “Under no circumstances must the



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American people permit only the Voice of America to be heard overseas, which is controlled by the party in power in Washington.”

McIntire had backers in Congress that were concerned enough about the inquiry to raise the matter with the FCC. Senator Sam Erwin raised questions about free speech and due process and the FCC apparently quietly dropped the inquiry.

Although an overreaction, the FCC inquiry did have a point. What Norris had promised and what WINB was transmitting were very different. The question is why. Norris certainly did not get rich by airing a schedule skewed towards Christian programming. In fact, WINB was at best breaking even at this time.

Norris probably intended to program his station as a mini-VOA, but ran into the same dilemma that has plagued every American commercial shortwave station before and after: How does one put on programming that will be enjoyed by most listeners and still pay the bills to keep the station on? Norris did the best he could, managing to air the gospel and take in enough money to keep the station going. The result was a station airing much of the same type of Christian programs that his AM outlet of WGCB carried.

McIntire and WINB also had a point. Freedom of speech is a basic human right. McIntire had a right to express his opinion and what difference did it make if his views were heard by foreign listeners? Weren't freedom of speech, peaceful debate, and respect for different opinions all democratic values that VOA was trying to instill in its audience?

Although dropping the inquiry of WINB, the FCC did respond to the problems it had with the station. The FCC imposed a freeze

broadcasting to this region.

Wise also bought an old AM transmitter from WGY in the mid 1970s and there were plans to convert this transmitter to short-wave. Norris' son, John Jr., took over the station, but he also had to devote a lot of time to ongoing television and radio operations in addition to WINB.



*The control room with a view of the transmitter through the window.*

### **Seeds of controversy**

All that changed in 1993. Details remain murky, but Pastor Peters, a Christian Identity minister from LaPorte, Colorado, became involved with the station. In addition to Peters' programs, other shows considered offensive by some, such as Ernst Zundel's *Another Voice of Freedom* and William Pierce's *American Dissident Voice*, were heard over WINB.

It was a repeat of the 1960s in many ways, but WINB was not alone this time. Other American stations were also airing the above programs in addition to many others. Critics to such programming often had a knee jerk reaction that such programming should be pulled—a move in itself offensive to some who believe strongly in freedom of speech.

The stations usually maintained that they would gladly air the viewpoints of anyone who opposed these programs. The critics didn't take them up on the offer, so only one side of the debate was heard.

WINB started having transmitter problems at this time and bad luck compounded them. A tractor clipped the South American antenna in the summer of 1994, sending it to the ground.

Then Jeff Baker arrived on the scene in 1995. Baker started out as a guest on some programs and he arrived at WINB with the goal of airing something called *Main Street Network*. A fluff piece in a trade publication from the time stated that the programming was for “patriotic Americans . . . 24 hours a day . . . 365 days a year.” Baker referred to it as a patriot format.

While the network's satellite feed may have been running on a daily basis, WINB certainly was not. Already crippled, the transmitter was off the air in March. It came back briefly, but, ironically, the transmitter broke down again on the day of the Oklahoma City bombing, 19 April, 1995, as the resident technician tried to operate the transmitter at too high a power.



*WINB's Continental 417B*

on granting licenses to any new shortwave stations starting in 1963. Ostensibly this was because of changes in regulating international communications by the International Telecommunications Union (ITU), but it seems that this was a response to WINB. The FCC was reportedly revising its regulations and rules during the freeze to take into account the changes made by the ITU—a process that took 11 years.

After all the excitement of the 1960s, WINB stayed out of the limelight for 30 years. The station aired mostly Christian programming and, in addition to English, the station had programs in Arabic, Spanish, and Russian. WINB added an antenna for Latin America during the 1970s and geared much of its operation to



Norris kept WINB off the air for several months. In the finger-pointing days after the bombing, American shortwave stations that had aired patriot programming came under examination. Norris ended his contract with Baker. Fred Wise was asked to repair the transmitter.

It took Wise until January of 1997 to complete repairs. The station returned to the air slowly, airing music for several months. Christian programs then started appearing slowly and now make up most of the station's current line up.

## Contacting WINB

Over the years, WINB has received reports from over 120 countries, so persistent listeners should be able to hear the station from just about anywhere. While the AM transmitter purchased in the 1970s is installed in the transmitter building, WINB has no plans to convert it to shortwave. WINB did add a web site in 1999 and there has been talk of adding streaming audio.

In the meantime, the only way to hear WINB is to listen for its Continental 417B. The remaining rhombic antenna is terminated now and is beamed towards Mexico, a beam that results in good reception over much of North America, particularly in the early evening hours. You can try for WINB as follows –

UTC	kHz
1700-1900	13800
1900-2300	13790
2300-0430	11950

WINB's web site is at [www.winb.com](http://www.winb.com). A quick email to [info@winb.com](mailto:info@winb.com) can answer any questions you might have about

*WINB was built  
from a converted  
chicken house*



the station. Postal mail and reception reports go to P.O. Box 88, Red Lion, PA 17356-0088. WINB will verify with a QSL, but return postage is requested.

*fldf*

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## About the Author

Hans Johnson is a freelance writer as well as a short-wave DXer. He is also founder of Cumbre DX, [www.cumbredx.org](http://www.cumbredx.org)



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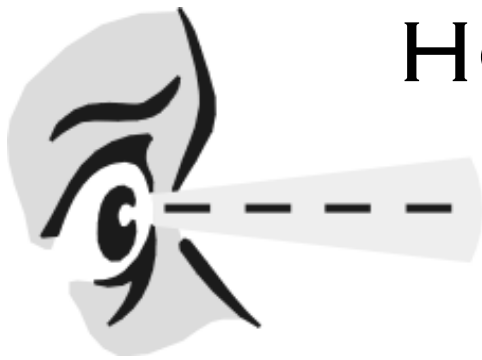
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For less demanding requirements, order the model BC 248CLT. Specifications are similar, but it has only 50 memory channels, Motorola antenna jacks, no service search, or 800 MHz coverage, or aircraft band.





# HOW FAR IS “LINE OF SIGHT?”

By Michael Scofield

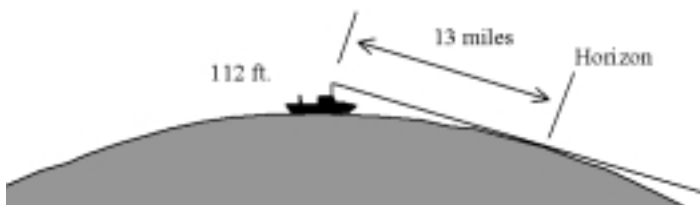
**R**adio signals in the VHF and UHF frequencies tend to propagate in straight lines and not reflect off any parts of the upper atmosphere. What little bending one might observe may be a result of a rare inversion layer or the knife-edge effect upon radio waves over a sharp mountain ridge.

There are instances where amateur radio operators have reported extraordinary distances in contacts on the 2-meter band (144-148 MHz) such as from California to Hawaii in rare conditions. But most of the time, the signals we can hear on our scanners are pretty much limited to our terrain situations. They are called “line of sight” signals.

So obviously, we can achieve greater distances (especially on a spherical earth) by having some elevation in either the transmitter or receiver. Which, of course, is why I like mountain tops.

The trigonometry for calculating whether you have a “line of sight” situation is not difficult at all (see sidebar). One must consider the radius of the earth, and a simple tangent function will yield how far away the horizon is at any particular elevation.

For example, a lookout on a ship sitting 112 feet above the water



**Fig. 1: The horizon from an observer on a ship.**

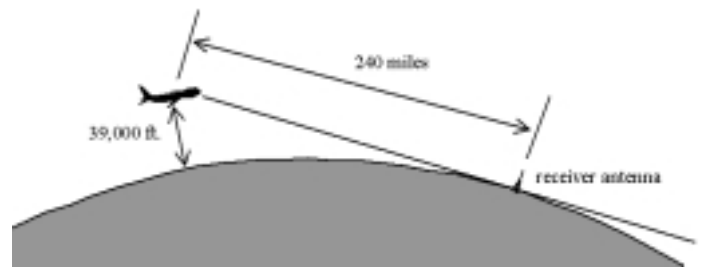
would see a horizon 13 miles away. Any object visible beyond that distance must be higher than mere sea level to be visible from the lookout.

Some sample distances to horizon from various elevations include:

10 ft. altitude	4 miles	6,700 ft. altitude	100 miles
600 ft. altitude	30 miles	26,700 ft. altitude	200 miles
2,400 ft. altitude	60 miles	41,600 ft. altitude	250 miles

By the way, this table could be extended much higher to calculate how high a satellite must be before it goes into the shadow of the earth. The same principle and formulas apply.

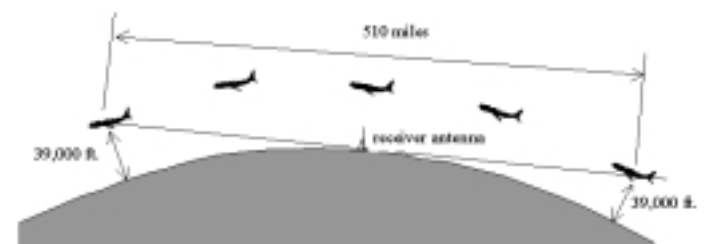
Extend this out to the limit, and an aircraft, to be heard, must be increasingly higher the further it is from the listener. A common cruising altitude for long distance flights is 39,000 ft. The VHF signal from an aircraft that high can be heard, theoretically, about 240 miles away, assuming there are no mountains blocking the path of the radio signal.



**Fig. 2: Typical horizon at 39,000 feet.**

On the midwest plains, it should be possible, under ideal conditions, to pick up a westbound commercial jet flying at 39,000 feet (“flight level 390”), and follow it 510 miles from east to west (see below).

In this instance, it may pass through five or more high-altitude air traffic control sectors, and it may take as much as an hour to make this passage. This maximum time would work, of course, only if its flight path takes it directly overhead.



**Fig. 3: Hypothetical maximum coverage from any spot on the prairie.**





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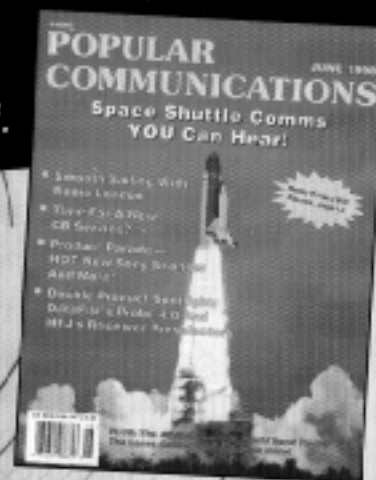
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Is it possible to improve your range by getting on top of a mountain? Certainly. California offers a number of opportunities to do this from a variety of high mountains adjacent to low valleys and plains. One of my favorite spots is Mt. Pinos, northwest of Los Angeles on the boundary between Kern and Ventura Counties. At 8,827 feet, the

summit affords a great view to the north and northwest, up the generally low San Joaquin Valley. (For example, Fresno has an altitude of only 296 feet, and much of the valley is lower than that.)

We can calculate that the effective horizon of an 8,000 ft. mountain is about 115 miles away, and from that point on the horizon, one could theoretically "see" a high-flying jet at another 240 miles distance, thus adding up to a whopping 350 statute miles.

In measuring this out on aeronautical charts, one generally must think in terms of nautical miles which are about 15% shorter than statute miles.

Mt. Pinos is popular for these kinds of radio tests. One day I encountered some members of the San Bernardino Microwave Society attempting to set a land distance record for microwave signals. From the top of Mt. Pinos, they were shooting signals up the San Joaquin valley all the way to friends on a mountain top in Oregon, as well as to Mt. Diablo east of San Francisco.

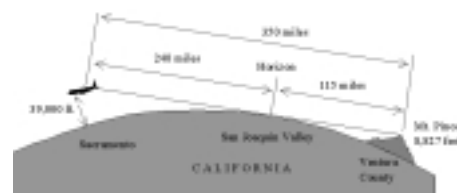


**Fig. 4: Northern view from Mt. Pinos in California.**

They did this using the amateur radio bands in the microwave region. Interestingly, they coordinated their efforts using the 40-meter amateur radio band. So Mt. Pinos is a good spot for attempting any kind of "line of sight" distance record.

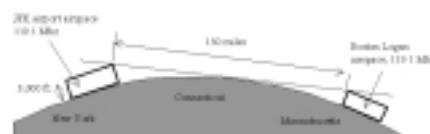
The best I have done sitting atop a mountain is about 290 nautical miles (251 statute miles). I parked at Dawson Saddle at about 8,000 feet in the San Gabriel Mountains north of Los Angeles and listened for aircraft talking to Salt Lake Center in the sector over Bryce Canyon, Utah. My distance could have been limited by the mountains around Las Vegas (which were at my theoretical "horizon" point about 100 miles away). Also, I was not using a beam, and the signal strength becomes an issue at those distances.

But what about my friends in the eastern U.S.? Well, even though the mountains are



**Fig. 5: Westerly view from Backbone Mountain in Maryland.**

not as high as in the west, you can get some distance advantage from what hills you can find. For example, Backbone Mountain is the highest point in the State of Maryland. Assuming it has a pretty clear view towards the west (over the panhandle of West Virginia and out over Ohio), we can get some distance advantage in that direction.

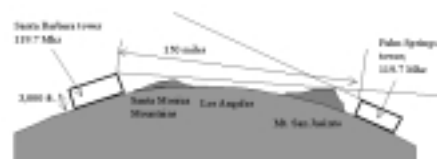


**Fig. 6: Noninterference of JFK and Boston Logan's air spaces.**

But, that part of Ohio is between 500 and 700 feet above sea level. So we must subtract that "higher horizon" from the elevation advantage of our 3,360 ft. mountain, and thus we only get about a 60-mile advantage before the horizon. Just the same, we should (theoretically) be able to hear commercial jets high over Cincinnati, some 300 miles to the west.

## Frequency Re-use

The Federal Communications Commission and Federal Aviation Administration, in assigning frequencies to air traffic control activities, must consider the interference between aircraft transmissions which might be within "line of sight" of each other. In general, the higher the aircraft using the air spaces, the further the separation of frequency re-use must be.



**Fig. 7: Noninterference of Santa Barbara and Palm Spring air spaces.**

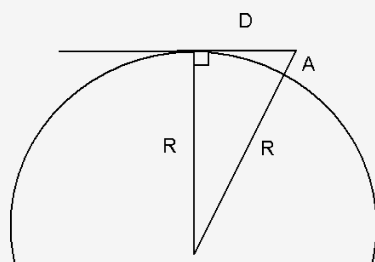
## CALCULATION OF ALTITUDE/DISTANCE TABLE

Assume the following geometry:

**R** is the radius of the earth in miles.

**D** is the distance to some point above the earth (either an aircraft in flight, or a mountain top) in miles.

**A** is the altitude that point is above the normal surface of the earth (e.g. sea level).



The original Pythagorean theorem is that in a right triangle, the sum of the squares of the hypotenuse (R+A) is equal to the sum of the squares of the other two sides.

$$(R + A)^2 = R^2 + D^2$$

Solving for the altitude in feet, and distance in miles, we have the following formula.

$$D = \sqrt{(R + A)^2 - R^2}$$

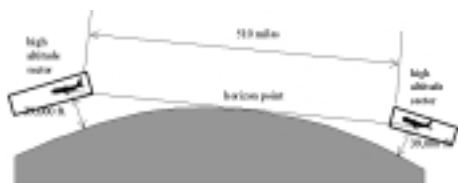
The above formula assumes, of course, that all are in the same units. But we generally talk about altitude in feet, and distance in miles, so we need to enter the following constant conversions.

$$D = \sqrt{(R + (A/5,280))^2 - R^2}$$

Write that into your spreadsheet program, and generate your own table for conversion of distance-to-horizon and elevation. The distance (D) is in miles, and the altitude (A) is in feet.



Control tower frequencies may be re-used over a short distance because the highest altitude a plane might be using that frequency is 3,000 ft. (above ground level). For example, Washington National Airport, New York's JFK airport, and Boston's Logan airport all use (among other frequencies) the 119.1 MHz channel as a "tower frequency," along with Pittsburgh and Williamsport-PA, Greensboro-NC, and Chesapeake-VA (near Norfolk).



**Fig. 8: Necessary separation of two high altitude ARTCC sectors sharing same frequency.**

Do they interfere with each other? No. For two reasons. One is the horizon effect. Two planes would both have to be at 3,700 feet altitude to begin to interfere with each other over a distance of 75 miles. But also, the very distance diminishes the signal intensity somewhat, compared with local signals. And there are a few low hills along the path in Connecticut.

In southern California, the towers at Santa Barbara and Palm Springs use the same frequency. However, they have substantial terrain between them. It is possible, however, to be on a mountain top somewhere between, and hear aircraft in both air spaces. But aircraft in those chunks of airspace don't seem to hear each other.

Approach control sectors would have to have a bit more separation, because the aircraft are going to be higher, sometimes up to 15,000 feet or more.

What *really* requires separation are the sectors of the en-route air traffic control (ATC) system, governed by the air route traffic control centers (ARTCC) around the country. These sectors, particularly the higher ones, require unique frequencies for a much wider radius.

High sectors and "super-high" sectors (where used) require substantial separation before the frequency can be re-used. Indeed, we may assume that at 39,000 ft. (or "flight level 390") the effective maximum distance to other aircraft also at 39,000 feet



**Fig. 9: Hypothetical radius of non-reuse of a high altitude ATC sector over Kansas.**

is 510 miles (Fig. 8). Therefore, that determines the radius of a circle (Fig. 9) wherein that ATC frequency cannot be re-used.

At this rate, a frequency used for a high-altitude sector directly over Kansas City could not be re-used for a 510-mile radius in any direction. It might be used in California, or over Atlanta or Detroit, but not closer. This is one reason that the FAA is so happy to be able to use the 0.025 MHz steps, particularly for en-route ATC sectors.

This radius of non-reuse is not always followed. I remember listening to the ATC audio entertainment channel on a United Airlines flight high over Tennessee, and hearing distant aircraft talking to some


other controller in another state. One might hope that the mere distance would reduce the signal strength (remember the inverse square rule?), but that is not always totally effective.

True, our local controller's transmission might drown out the distant signals, but we could probably still hear that characteristic tone of the beat between the two AM transmitters.


As can be seen, the height of both the transmitter (or aircraft) and our own antenna leverage how far we can hear a VHF signal. So find a mountain top near you, and discover what you can hear. (Sorry about you readers in Florida; perhaps you can use a rooftop!)

*llf*


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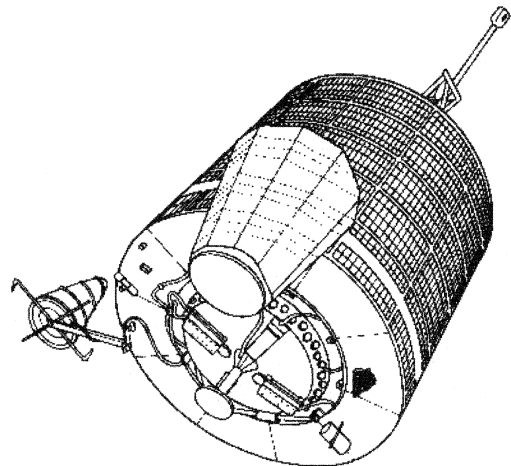


U.S. General Services Administration

# Decoding the Russian LEO Navigation Satellites

## Part Two: Unlocking the Secret Behind the Signals

By John David Corby



In Part 1 we looked at the Russian Low Earth Orbit (LEO) navigation satellite system to learn about its history, its function and its current status. We also revealed just a little about the signal that these satellites transmit and how amateur monitoring stations can be set up to receive them.

To recap the basics of the signal, we can summarize it as a 50-bits-per-second audio frequency encoding scheme. The carrier signal is based on a set of frequencies with 30 kHz spacing from 149.91 MHz to 150.03 MHz. The data is carried in sidebands at 3 kHz, 5 kHz, and 7 kHz. Even with this information we know far too little to be able to decipher the message that the satellites are transmitting. Fortunately, the difficult task of interpreting the structure and content of the signal was accomplished more than twenty years

ago by the famous Kettering Group.

I am

wholly indebted to a number of people who did the basic groundwork which forms the foundation for this project. The source papers for the basic theory are listed at the end of this article. To these people I give my unreserved gratitude and my admiration for the incredible original study which made this project possible.

Even knowing the theory behind the decoding and interpretation of the data does not give an instant answer to our immediate challenge, though. How can we turn a rapid series of audio tones coming out of a receiver's speaker into a meaningful message?

After wrestling with this question for many months, a technique was devised which, while a little cumbersome, is reliable and achievable by anybody equipped with a scanner, a PC, and some readily available software.

If you would like to try this project for yourself, you are going to need a PC running Windows 95/98. (There is probably a parallel to this solution in the

Linux and Mac worlds, but I have not explored those fields myself.) The PC must have a soundcard, because we are going to plug the output of our receiver into the PC to get at the data that we want to decode.

You are also going to need two pieces of software. The first is an audio frequency spectrum analysis program. I use a program called "Spectro-

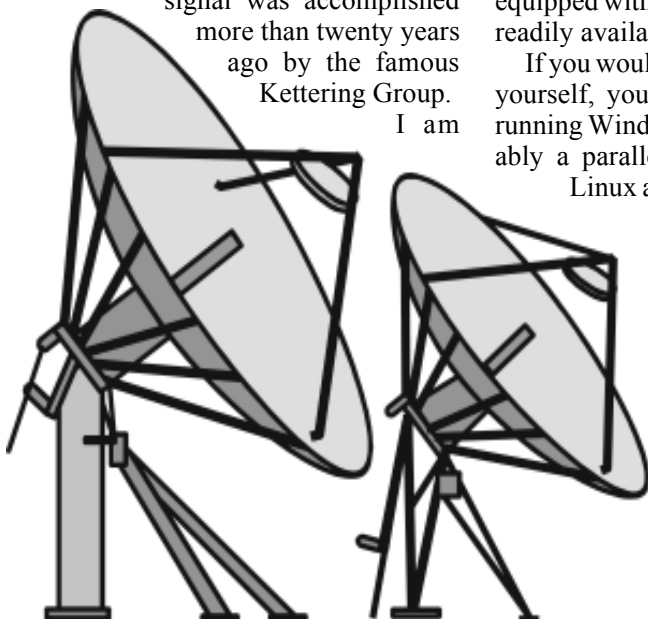
gram" written by R.S.Horne. It is freeware and very easy to use. You can find Spectrogram on many of the Shareware sites on the Web. The second piece of software is a spreadsheet program. I use Microsoft Excel, but you may use your choice of software, so long as it is Windows-based.

### Converting Audio Samples into Data

If you followed the advice in Part 1, you will have already set up a monitoring station which is capable of receiving a sustained clear signal from the Russian LEO navigation satellites. With your receiver output plugged into your PC soundcard, you can use "Spectrogram" to produce a bitmap image of the received signal waveform, such as the one shown in the upper part of figure 1. We do not have the space to provide a tutorial on the use of the software here, but you will accomplish this task without a lot of difficulty if you are reasonably computer-literate.

The goal of this step is to produce a bitmap image of a one-second sampling of the received signal. You are going to need a lot of these samples to fully analyze the data, but to begin with, just collect a series of five or six to show the progression of the time-of-day clock transmitted by the satellites.

The bitmap image of the signal spectrum shown in figure 1 is a one-second sample. It represents a basic 50-bit "word." You can see that it is made up of a series of 3 kHz and 5 kHz pulses which carry the encoded signal. The start of the





word is marked by a short pulse of the 7 kHz tone. At the top right-hand corner of the image you can see the next 7 kHz pulse which represents the start of the next word.

The 50 bit word carries a time-of-day signal in the first 18 bits. Figure 1 illustrates the basic concept of how information is carried on the audio signal. We will use our spreadsheet to convert the image into data which we can manipulate. Figure 2 is a snapshot from a part of the main screen of the author's own spreadsheet decoding program.

To prepare the spreadsheet, you will need to set the width of 50 columns to one character wide. These will be our "data columns," each cell representing a time slot of 20 milliseconds. Next, import the bitmap image and position it such that the leading edge of the 7 kHz timing pulse at the start of the 50-bit word aligns perfectly with the first of the 50 data columns in your spreadsheet.

Now click the image to produce sizing handles, and stretch the image until the leading edge of the 7 kHz pulse at the top right of the image aligns perfectly with the start of the first column following

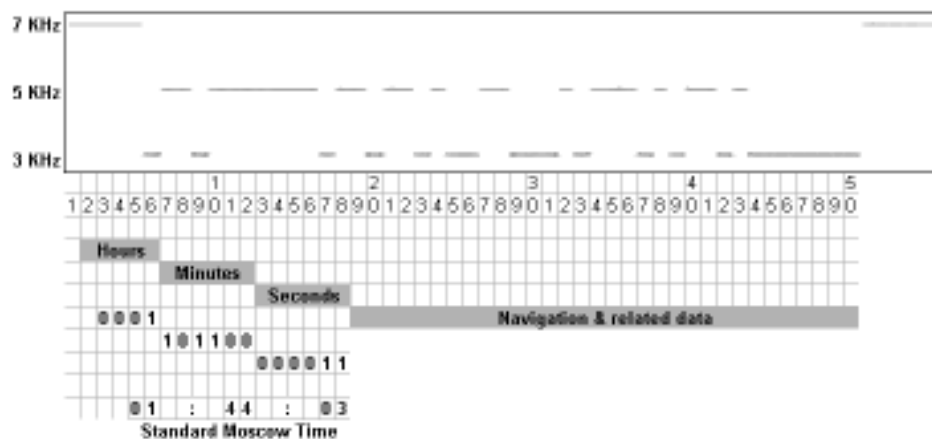


Fig. 1. Russian navigation satellites - Word structure

your 50 "data columns." You can now enter a "1" or a "0" in the cells of the row immediately below the image, corresponding to the 3 kHz and 5 kHz pulses in the image. Refer to figure 1 for guidance.

There is a bit of a surprise waiting for you here. The 7 kHz marker pulse at the start of each word always represents a logic 0. The first 3 kHz or 5 kHz pulse following the marker pulse always represents a logic 1. In other words, a logic 1

can be represented by either a 3 kHz, or a 5 kHz tone. In actual fact, it doesn't matter which tone is present immediately after the marker. The appearance of a 3 kHz or 5 kHz tone is determined by the tone representation at the end of the previous word. Don't let this confuse you; just remember that the transition from the 7 kHz marker pulse to either of the other two tones represents a logic 1.

Our signal has one more joker up its sleeve that we have to overcome before

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the data begins to take shape. The format of the raw data is NRZ (Non-Return to Zero). That means that a logic 1 is represented by a transition from 3 kHz to 5 kHz (or vice-versa), while a logic 0 is represented by no transition from one 20 millisecond time slot to the next. Consequently, if the same tone appears in two or more consecutive timeslots (or cells), there is no change in logic state.

You are going to have to enter a second row of 1's and 0's below the image to translate from NRZ to regular binary format. The rule to follow here is to record a binary "1" for every time slot where a transition occurs, and a binary "0" wherever there is no change from one time slot to the next. With practice you can convert from NRZ directly, although I make my spreadsheet do that automatically for me.

### Passing the Time of Day

The first, and easiest, data that we will now decode is the time-of-day. But first, in Part 1, if you remember, we set some homework. You were asked to listen to the 7 kHz pulses before, and immediately after, 00:00 hours DMV (UTC+3). If you did your homework you will have observed that the 7 kHz pulse is much easier to hear immediately after 00:00 DMV. The reason is very simple – the 7 kHz pulse lasts longer! The 7 kHz pulse can be as short as 20ms, but at exactly 00 hours, 00 mins, 00 seconds DMV it stretches through all the timeslots to the first appearance of a logic 1. If that first logic 1 appears in time slot 19, the 7 kHz marker pulse will be 360ms long, and very easy to hear.

The hours field is contained in bits 2-6, the minutes in bits 7-12, and the seconds in bits 13-18. Decoding is very simple, since simple binary encoding is used in this part of the signal. If you accurately record the time at which you received the signal from the satellite, you can check your decoding skills by correlating the decoded time signal with the time of the satellite's pass entered in your log. Unless you are in the same time zone as Moscow, you will have to correct

for your local time zone of course.

So, referring again to Figure 2, we can see that bit position 1 is ignored. It is always used by the 7 kHz marker pulse. In this case we can see that bit positions

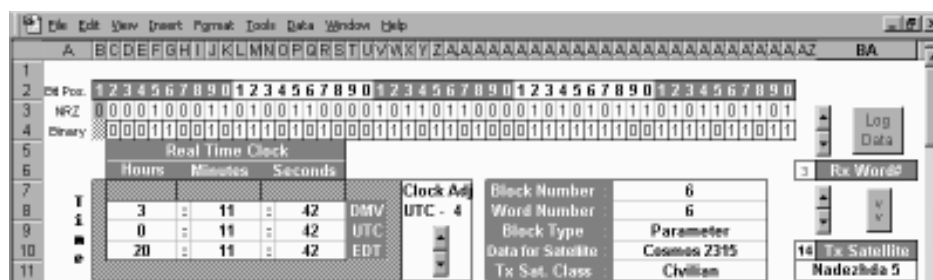


Fig. 2. Snapshot from the author's own decoding program

2, 3 and 4 contain logic 0's. This suggests that, in this case, the 7 kHz marker pulse extended for four time slots, making it 80ms long.

Bit 5 is the first time slot to hold a logic 1. There is also a logic 1 in the next time slot. Since bit positions 2-6 contain the encoded "hours" field, we can use simple binary conversion to reveal a decimal "3" in this field.

Similarly, bits 7-12 hold the binary equivalent of decimal "11" in the minutes field, and bits 13-18 hold the binary equivalent of decimal "42" in the seconds field. As you can see from the bottom right of Figure 2, the transmitting satellite in this example was Nadezhda 5. It was passing over the author's monitoring station at 03:11:42 DMV which is 00:11:42 UTC.

As we revealed earlier, the key to identifying the content of each word is the time-of-day signal contained within the word. A complete data segment requires 2 minutes of signal, and contains two frames each holding 8 blocks of data. Each block is made up of seven words of 50 bits each. The beginning and end of each frame is marked by two special words which carry no data. The time-of-day is used as a key to determine which kind of block is being transmitted in any particular word, and also reveals what data is available within that word.

### Further Study

Figure 2 reveals some of the other data which can be obtained from the signal. It can be seen in the block of cells in the lower center of the figure. Each satellite in the system transmits information about the other satellites of its own class. In this example, Nadezhda 5 was transmitting

information about Cosmos 2315. We can extract data with which to construct a picture of all the operational satellites within the Russian LEO navigation system by examining the appropriate information blocks transmitted by the satellites.

Besides the time-of-day information, the remainder of the data contains several blocks of data which is really only useful if you are navigating a vessel at sea. This data is held in what are called "Co-

ordinate Blocks." The information stream also contains "Parameter Blocks" that hold data which is more useful to the amateur monitoring enthusiast. Unfortunately, much of the data is not encoded using straight binary and is rather more difficult to decipher.

A detailed study of the decoding of every word is not possible within the confines of a magazine article, but anyone interested in giving it a try is urged to contact the author by e-mail at [johndavidcorby@yahoo.com](mailto:johndavidcorby@yahoo.com)

A more detailed analysis of the data structure will be available shortly on the HearSat website at

<http://www.hearsat.org/>

The Russian LEO navigation satellite system is a fascinating target for the monitoring enthusiast. The signals are easy to receive, and the data, as you will now understand, is fairly simple to decode. Good luck with your satellite monitoring, and remember to keep listening up!

*JD*

### References:

*Philosophical Transactions of the Royal Society*, London A 294, 1980. Geoff Perry and Chris Wood, The Kettering Group.

*A Time Code Reader/Display for Russian Tsikada Satellites*. John M. Franke

### About the author:

John David Corby is a Canadian amateur satellite monitoring enthusiast living near Toronto. John is the founder of the HearSat Group which maintains a website at [www.hearsat.org/](http://www.hearsat.org/), and a mailing list "HearSat-L" on QTH.net. Questions and comments are welcome at [johndavidcorby@yahoo.com](mailto:johndavidcorby@yahoo.com).



# 20th CENTURY NOSTALGIA

## Forbidden Signals from an Ancient Transmitter

By Ralph C. Craig, AJ8R

*The sounds that suddenly erupted from the speaker of the communications receiver during my usual Saturday monitoring session were horrendous. Snapping, crackling, frying, sizzling, sounding like an electric arc welder in the same room -- "static" so strong it wiped out most of the low frequency (LF) beacon band to which I was listening. Never before had I heard such signals. The static," erratic and intermittent, consisted of short periods of quiet, interspersed between short and long bursts of "noise."*

*As I cogitated on the characteristics and source of these strange signals, little did I realize they would lead to an interesting search for the source, reception of forbidden signals, a gift culminating in a serendipitous discovery, and possibly the setting of a new record.*

**T**he small, rural town in Ohio where I lived was ideal for radio monitoring. There were no radio transmitters (except the sheriff's) within 15 miles to cause interference, and only one small manufacturing plant.

Therefore it was a very unusual event when on this Saturday morning there suddenly appeared these strange noises. Static, with a level of QRN-5<sup>1</sup>, simply wiped out almost all reception. It was strong; QRN-5 doesn't adequately indicate its intensity. It pegged the "S" meter.

Quickly tuning through the entire tuning range of the receiver I found the interference on all bands, but with diminishing strength in the higher bands. There appeared to be some relationship between the blocked portions, almost as if they were harmonically related, but the broad band characteristic and the intermittent nature of the signals made it difficult to identify this relationship.

The sound of the static, a raspy buzz, appeared similar to that generated by an electric welder, a faulty fluorescent light, or the arc-over of a power line insulator, but then again it seemed to have a slight melodic tone. The off and on periods, although they were erratic and varied greatly, seemed to be in code. Listening carefully, I could discern what appeared to be ragged dots and dashes. Concentrating intently, I could make out what appeared to be letters, but could not decipher any words.

What was the nature of this interference? Where did it originate? Why was it so strong? How was it radiated? How could it be eliminated? I had to find out.

### A little radio detective work

In order to increase the power carrying capacity of its secondary distribution system, the power company serving the town had recently increased the line voltage to 13.5 kilovolts. This had resulted in failures of some line insulators. Thinking that this might be the cause, as the "static" did sound some-

what like an insulator arc-over, I took a small battery-operated AM BCB receiver<sup>2</sup> and began checking around the area outside of my apartment. The "signal" appeared to come from every direction, seeming to be radiated from the power lines. However, there was a slight peak that pointed *directly to my apartment*.

The building where I lived was a converted residence with two apartments. The basement was shared by both apartments, one area serving as a laundry. As I entered the basement, I saw at the far end "Mr. Jones"<sup>3</sup> our downstairs neighbor, leaning over a workbench. On the bench was a olive drab box with wires running from the box to a jumble of wires on the floor. I approached Mr. Jones, explained what I was doing and asked if he had received any static on his radio. His answer intrigued me.

Pointing to the box he said, "No, I've been down here, trying to get this here thing to work, haven't listened to a radio at all."

As we talked I looked at what was on the bench. There I saw a wooden box about 10" square and 3" deep, with a spiral of brass strip on the top. Several wires were connected to it. One wire ran to the jumble of wire on the floor, two wires were connected to a battery, and two others wires with their ends stripped were held together with tape. (A key?)

As we talked he told me how a friend cleaning out his barn had found this "box" and had given it to him. He had tried to hook



**BC-15A, Airplane Radio  
Telegraph Transmitting Set Box,  
looking at top of unit.**



**Close-up of top of induction coils showing contact arrangement. Item to right is spark gap.**

it up and make it work but had had no success. He didn't have any idea what it was, how it was supposed to work, or if he had it wired up correctly.

He continued, "when I press these two bare wire ends together all that happens is a flash of bluish light coming from inside the box, nothing else." As he said this he pressed the two together. Instantly a wisp of smoke, the pungent smell of ozone, a flash of bluish light, and the sound of a spark jumping a gap erupted from the "box." At the same time the BCB receiver in my hand went berserk.

I had found the source of the "static"!

## A Gift

As we continued to talk Mr. Jones made me an offer I couldn't refuse.

"This here box is a piece of junk, I don't know nothing about it, I can't make it work, you work in electronics, here take it."

Quickly before he changed his mind I accepted. Not only would this eliminate the source of the "static," but I would have something interesting to investigate. (Little did I know just how interesting this item would be.)

When the box was closely examined I made a serendipitous discovery. The device was, in fact, a valuable antique. The wooden box that was approximately 10 inches square and 3 inches deep formed what could be considered a chassis. The top was a phenolic sheet 1/4 inch thick. On this sheet was mounted a spiral made of sheet brass 1/32 inch thick and 1/4 inch wide.

Several small phenolic blocks mounted on the spiral were engraved with numbers.<sup>4</sup> A wire with a clip on one end, that could be attached at any point around the spiral, came from inside the box. A second clip mounted on a wire that also came from inside of the box was attached to the strip at the beginning of the spiral.

Mounted on the phenolic plate were four binding posts with engraved markings nearby; one said "Battery," one said "Key," another said "Counterpoise," and the last said "An-

tenna." Obviously this was some kind of a transmitter.

The top plate was hinged and secured with two latches. Opening the top I saw a small wooden box with two terminals on top and a larger wooden box with four terminals on the side.

Mounted on top of the larger box was an arrangement of fixed and movable contacts. In an isolated corner of the box were mounted two gray "globes" of some unknown material<sup>5</sup>. One "globe" was fixed and the other mounted on a screw so the spacing between the "globes" could be adjusted. Several hookup wires connected the separate parts. A small mica window mounted in the side of the box allowed viewing the "globes" from the outside.

Having studied to become a marine radio officer in the "40's," the minute I saw this arrangement of parts I knew what the "box" was, how it operated, and why it caused "static." My deduction was verified when upon closing the cover I discovered on the outside a small brass plate badly scarred with corrosion on which were stenciled the name and identification number of the "box" (see photo).

Slowly I deciphered the label. "Signal Corps, U.S. Army, Airplane Radio Telegraph Transmitting Set Box, Type-BC-15A, Order Number 140274, Date Aug. 21, 1916, Made by Connecticut Telephone and Electric Company." The "box" was an "ancient" **spark gap transmitter**.

Later I learned that it was one of the first radio transmitters to be operated from an airplane on a regular basis. A spark gap transmitter of bygone days, it was more than 70 years old – truly an antique.



**Close-up of spark gap which forms the spark. The large size of the gap is to facilitate cooling.**



**Signal Corps, U.S. Army.**

**Airplane Radio Telegraph**

**Transmitting Set Box**

**Type BC-15A**

**Order No. 140274 Date Aug. 22, 1918**

**Made By**

**Connecticut Telephone & Electric Co.**

## One for the Record Books

The signals (static) emitted by the BC-15A, a spark gap transmitter<sup>6</sup>, are of the "damped wave" class known as type "B" modulation<sup>7</sup>. This type of modulation, because of its wide emission spectrum that caused interference over many frequencies, was prohibited more than 60 years ago by international agreement.

True, "Mr. Jones" had no idea of what he was given, had no idea of what he was hooking up, nor any idea that he was radiating prohibited signals. True, the signals he sent were of a make and break nature, a series of dots and dashes. True, the code was not standard Morse and did not form words. But the question remains, am I the last radio amateur to receive over the air transmissions from a spark gap transmitter?

*MF*

## Notes:

1. *The ARRL Handbook for Radio Amateurs*, 1995, American Radio Relay League, Newington, CT, 06111, Page 30.50, paragraph 30.64 "Q-Signals."

2. AM BCB AM Broadcast Band 530-1700 kHz

3. Name changed.

4. Blocks indicate position for tuning of spiral coil, frequency or wavelength, unknown.

5. It was later learned that the globes were made of zinc. Corrosion had made them hard to identify.

6. For a full description of Spark Gap Transmitters, see; Nelson and Hornung, *Practical Radio Telegraphy*, McGraw-Hill, New York, New York, 1928, Chapter XIV, "Spark Gap Transmitters."

7. Nelson and McKenzie, *Radio Operating Questions and Answers*, 1955 edition, McGraw-Hill, New York, New York, 1955, Page 66, paragraph 6.511



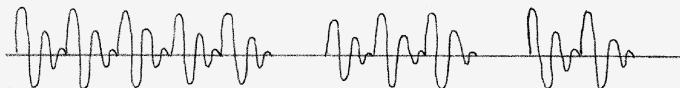
## Spark Gap Theory and History

A spark gap transmitter, such as the BC-15A, uses the same type of circuit Dr. H. Hertz employed during his famous experiments when he discovered "ether" (radio) waves. Similar circuits and emissions were utilized by Marconi in his historic transatlantic transmissions and later by hundreds of ships in the early 1900s. The steam ship *Republic*, the first to send distress traffic after a collision at sea, and the *Titanic*, before it sank after hitting the iceberg, used the same type of circuit as the BA-15A to summon aid.

A circuit consisting of a condenser (now known as a capacitor), an inductor (coil), and a spark gap connected in parallel is shock excited by an electric charge jumping the gap. The circuit when excited "rings" (like a bell that when struck continues to ring), generating an oscillating current at the resonant frequency of the inductor-capacitor combination. The spark continues to jump the gap until resistance and other factors in the circuit cause the voltage to fall below the level sufficient to maintain the spark.

This current, which diminishes in strength over time, generates what is known as a damped wave. When the strength of the oscillation reaches a point where the voltage is no longer sufficient to jump the gap, the oscillations cease until the circuit is again charged up by an external source.

Oscillations continue as long as energy is supplied to the circuit. The damped oscillations, if viewed on an oscilloscope, would look like those in figure A.



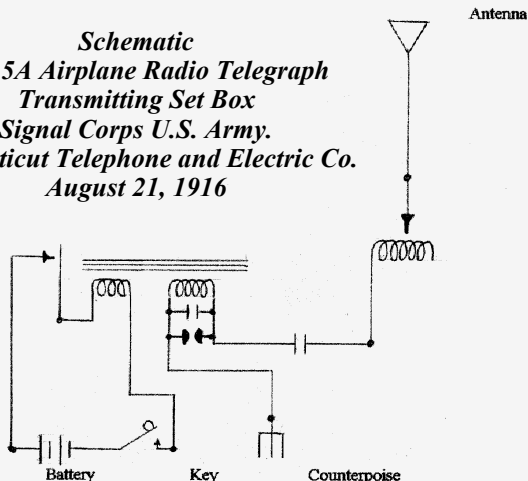
If the oscillating circuit is coupled to an antenna and counterpoise either by direct connection, a second winding on the coil (inductance), or by a capacitor, electromagnetic (radio) waves are radiated into space.

If the power source for the spark gap circuit is controlled by a rapid acting switch (key), the on/off nature of the resulting waves can be used to send information by use of Morse code. By changing the source of the electric current from a d.c. source to an a.c. source (typically it was a 500 Hz source), the emissions take on a tonal quality and are easier to "read."

A typical shipboard transmitter used power of about 500 watts while shore stations used thousands of watts. The BC-15A used only a few watts. The distances the transmissions could be received varied with the power used, from a few miles for the BC-15A, 100 to 200 miles for 1/2 kW, and 500 to 600 miles for the 5 kW stations.

In the early radio rooms, the spark jumping the open gap was a very impressive sight, especially at the shore-based 5 or more kilowatt sites. This awesome sight gave rise to the nickname "Sparky" or "Sparks" and the insignia of crossed lightning bolts that are still used today for radiomen.

**Schematic**  
**BC-15A Airplane Radio Telegraph**  
**Transmitting Set Box**  
**Signal Corps U.S. Army.**  
**Connecticut Telephone and Electric Co.**  
**August 21, 1916**



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# GLOSSARY

A Glossary of radio related terms used in *Monitoring Times*. (See [www.grove-ent.com/mtglossary.html](http://www.grove-ent.com/mtglossary.html) for a much more comprehensive list.)

## THE RADIO SPECTRUM

ULF - Ultra Low Frequency (3-30 Hz)  
ELF - Extremely Low Frequency (30-300 Hz)  
VF - Voice Frequencies (300 Hz-3 kHz)  
VLF - Very Low Frequency (3-30 kHz)  
LF - Low Frequency (30-300 kHz)  
MF - Medium Frequency (300 kHz-3 MHz)  
HF - High Frequency (3-30 MHz)  
VHF - Very High Frequency (30-300 MHz)  
UHF - Ultra High Frequency (300 MHz-3 GHz)  
SHF - Super High Frequency (3-30 GHz)  
EHF - Extremely High Frequency (30 GHz and above)

// - Indicates a Parallel Frequency

μF - Microfarad

μH - MicroHenry

AC/ac - Alternating Current

AGC - Automatic Gain Control

AM - Amplitude Modulation

ARRL - American Radio Relay League

BCB - Broadcast Band (530-1705 kHz AM)

Bd - Baud

BFO - Beat Frequency Oscillator

BNC - Coax connector commonly used with VHF/UHF equipment

CB - Citizen Band

C-band - 3.7-4.2 GHz

Comm - Communications

CQ - General call to all stations

CTCSS - Continuous Tone Controlled Squelch System

CW - Continuous Wave (Morse code)

DAB - Digital Audio Broadcast

dB - Decibel; dBi- decibels over isotropic

DBS - Direct Broadcast Satellite

DC/dc - Direct Current

de - Morse code prosign meaning "from"

DSP - Digital Signal Processing

DTMF - Dual Tone Multi Frequency

DTRS - Digital Trunk Radio System

DX - Distant Station Reception

DXer - A person who engages in the hobby of distant radio/television reception

DXing - The hobby of listening to distant radio or television signals

DXpeditions - DX Expeditions (trips to the boonies by radio listeners)

ECPA - Electronic Communications Privacy Act

ECSS - Exalted Carrier Selectable Sideband

E-skip - Sporadic E-layer ionospheric propagation

FCC - Federal Communications Commission

FD - Fire Department

FM - Frequency Modulation

Freq - Frequency

FRS - Family Radio Service

GHFS - Global High Frequency System

GHz - Gigahertz

GMDSS - Global Maritime Distress and Safety System

GMRS - General Mobile Radio Service

GMT - Greenwich Mean Time (replaced in most applications by UTC)

GPS - Global Positioning Satellites

GSM - Global System for Mobiles (900 MHz)

HT - Handi Talkie/Handheld Transceiver

Hz - Hertz

ID - Identification

IF - Intermediate Frequency

IRC - International Reply Coupon

ISB - Independent Sideband

kHz - Kilohertz

km - Kilometer

Ku-band - 11.7-12.2 GHz (plus 12.2-12.7 GHz in North America)

kW - Kilowatt

LCD - Liquid Crystal Display

LED - Light Emitting Diode

LNA - Low Noise Amplifier

LNB - Low Noise Block Downconverter

LNBf - Low Noise Block Downconverter Feedhorns

LSB - Lower Sideband

LT - Local time

LW - Longwave (150-300 kHz)

mb/MB - meter band/Megabyte

MDT - Mobile Data Terminal

MF - Medium Frequency

MHz - Megahertz

ms - milliseconds

MT - Monitoring Times

MUF - Maximum Usable Frequency

mW - Milliwatt

MW - Medium Wave (typically 530-1710 kHz)

MW - Megawatts

NCS - National Communications System/Net Control Station

NDB - Non-Directional Beacon

NFM - Narrowband Frequency Modulation

NiCd - Nickel Cadmium Battery

NiMH - Nickel Metal Hydride battery

No Joy - Station did not answer call

NWR-SAME - National Weather Radio Specific Area Message Encoding

Ops - Operations

Packet - Amateur radio error correcting mode

PC - Personal Computer/Printed Circuit

PCS - Personal Communication System/Satellite

PD - Police Department/Primary Data

PFC - Prepared Form Card

PL - Private Line

Q - Performance rating regarding selectivity or bandwidth

QRM - Interference from another station

QRN - Interference from natural or man-made sources

QRP - Low power operation

QSL - A card or letter confirming reception of a radio station

QSO - Communications between two or more stations

QTH - Location

RDF - Radio Direction Finding

RF - Radio Frequency

Rptr - Repeater

RTTY - Radioteletype

SASE - Self Addressed Stamped Envelope

S-band - Microwave frequencies above UHF

SCA - Subsidiary Carrier Authorization (now known as SCS)

SCPC - Single Channel Per Carrier

SCS - Subsidiary Carrier Service

SELCAL - Selective Calling

Sesqui - A "Hauserism" meaning one and one-half

SINAD - Signal to noise and distortion ratio

SINPO - A code system used by radio hobbyists to indicate how well a station was received: S=Strength, I=Interference, N=Noise, P=Propagation, O=Overall (sometimes shortened to SIO)

SITOR-A(B) - Simplex teleprinting over radio system, mode A (B)

S-Meter - Signal Strength Meter

SMR - Specialized Mobile Radio

S/N Ratio - Signal-to-Noise Ratio

SSB - Single Sideband

SSN - Sunspot Number

SW - Shortwave (high frequency - HF)

SWBC - Shortwave Broadcast

SWL - Shortwave Listener

SWR - Standing Wave Ratio

Tac - Tactical

Tent - Tentative

TIS - Traveler Information Service

TVRO - TV Receive Only

Tx - Transmit

UHF - Ultra High Frequency

UKoGBaNI - United Kingdom of Great Britain and Northern Ireland

ULS - Universal License System

Unid - Unidentified

USB - Upper Sideband

UT - Universal Time

UTC - Universal Time Coordinated

Vac/VAC - Volts Alternating Current

Vdc/VDC - Volts Direct Current

VFO - Variable Frequency Oscillator

VOLMET - Aviation Weather Broadcasts (on HF)

VOX - Voice Operated Relay

VSWR - Voltage Standing Wave Ratio

WAM - Wideband Amplitude Modulation

WEFAX - Weather Facsimile

WFM - Wideband Frequency Modulation

wpm - Words Per Minute

WWV - National Bureau of Standards Time Station, Ft. Collins, CO

WWVH - National Bureau of Standards Time Station in Hawaii

Wx - Weather

WXSAT - Weather Satellite

X-band - Expanded AM broadcast band (1610-1700 kHz)

Zulu - Military time zone (same as UTC)

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# Of Dropped Shoes and the Future of Ham Radio

It's funny how things work out sometimes. I initially started work on this column with the intent of writing about the future of low power FM broadcasting. My search for information took me to the obvious location [www.fcc.gov](http://www.fcc.gov) on the last Thursday of last year. This turned out to be a very important date for the radio hobby for an entirely different reason and, as you will see below, brought about a shift in my thinking for this month's column. We'll get to low power FM broadcasting another day.

On December 30, 1999, just as we were bringing the nineties to a close, as they say, "the other shoe dropped." The Federal Communications Commission (FCC) gave radio hobbyists a bit of a belated Christmas present. On this date, the FCC issued its long awaited Report and Order changing Title 47 - Chapter 1 - Part 97 of the Code of Federal Regulations. These changes, scheduled to take effect on April 15, 2000, massively (some would say radically) restructure the Amateur Radio license system.

In the time since this license restructuring was proposed many folks have weighed in with their opinions. Everything from "Free at Last" to "There Goes the Neighborhood" and all sentiments in between has been expressed about the December 30<sup>th</sup> move by the FCC. As a matter of fact, it was the plethora of pre-filed comments both for and against the change in amateur radio licensing that slowed down the FCC's movement toward their eventual resolution.

But this is the Beginner's Corner. As such, this is the place where we can take a look at these events and see what they mean for folks starting out in the exciting world of the radio hobby. It is Old Uncle Skip's opinion (and remember folks, I'm one of those ole poops who got his ham licenses the "old fashioned way") that the new licensing system is great news for beginners. Let's unpack this idea a bit.

## How it used to be

Under the old license structure there were six license classes – Novice, Technician, Technician Plus, General, Advanced and

Extra – comprising five theory exams and three code comprehension tests set at 5, 13 and 20 words per minute. As someone who took all eight of those elements at one time or another, I can attest to the level of skill and dedication required to reach Extra and I can understand why some folks are not that thrilled that the new system will let folks move up through the license classes a bit faster than in the past.

The new license structure that will come into existence next month will have only three classes of license – Technician, General and Extra. There will be only three theory exams and a single 5 word per minute code comprehension test.



Now allow me a brief bit of editorializing here. Back in the late sixties there was a great deal of weeping and wailing and gnashing of teeth over the FCC's decision to revamp the amateur radio license structure into what was known as "Incentive Licensing." Essentially, Incentive Licensing created the graduated structure that, over time, gave birth to the six-license system. The idea was to allow the radio hobbyist to move through a series of steps from Novice to Extra based upon increasing demonstration of skills and abilities.

Now here comes the interesting part. The license structure that was in place before Incentive Licensing consisted of (I bet you've guessed already) just three licenses (known

as A, B, and C). In essence, the FCC has gone "back to the future." Now I am just enough of a curmudgeon to wonder how many of those folks who are all upset about the FCC's current maneuver were the same ones making all the noise when Incentive Licensing became the law of the land.

And then there are some folks who are also upset about the reduction of code requirements. Speaking as somebody who loves CW, I just don't see any real problems with the new structure. Working code is an admirable skill, but it has little to do with technical expertise in terms of radio communication. I don't enjoy working in code mode because I passed a series of tests on the subject. I enjoy code because, once you stop taking tests and start using it to talk to people, it's loads of fun.

If anything, in my case at least, pushing myself through the testing made code more of an annoyance than a pleasure. It was only after I achieved the privileges that let me get down on the bands amongst good CW ops that I really began to appreciate and enjoy Morse code.

So if the cost of entry is now only a 5 wpm test, well, welcome aboard. Wade on in. I'll be happy to QRS (send slower) to meet your speed down in the CW portions of the bands. A lot of Elmers did that for me and *that* is what got me hooked on CW, not passing the 20 wpm test.

But enough soapbox. Let's get down to the meat and potatoes of how beginners can use the new structure to join in the fun of ham radio.

## The future as we know it

First and foremost, what we currently call the "No Code" Technician Class license remains in place but with some big changes in the exam department. Under the old structure, getting your Tech required that you pass the 35-question Novice theory and regulations and the 30-question Technician class theory exam – 65 questions in all.

The new Technician exam will be a single 35 question multiple-choice test covering basic theory and regulations. This becomes

the true entry-level license that should be accessible to anyone who wants to get involved in amateur radio. It is not unlike the original Novice class license that I took many moons ago except that its operating privileges and frequencies are directed to the VHF/UHF ranges while the old Novice beginners operated in limited portions of the HF amateur radio bands.

Since the FCC did not make any rulings to "reform" the amateur radio spectrum in their restructuring document, any Technician Class amateur licensed after April 15, 2000, will get privileges allowing access to all Amateur Radio frequencies and modes of operation above 50 MHz. To spell this out in detail, this includes 50 MHz through 54 MHz, 144 through 148 MHz, 222 through 225 MHz, 420 through 450 MHz, 902 through 928 MHz and 1240 through 1300 MHz.

Technician Class operators can use currently approved modes of amateur radio communication including code, voice, data, RTTY, and TV. As any scanner monitor can tell you, there are many exciting propagation features to the VHF world. Signals can go extreme distances thanks to tropospheric ducting, sporadic "E" layer skip, and meteor scatter.

Another important feature of VHF/UHF operation is the antennas are physically smaller and lend themselves to a great deal of experimentation. The entry level transceivers are usually self-contained and can be relatively inexpensive as well. All this radio hobby action for passing only a 35 question test. Allow me to say (with affection of course), "*You newbies don't know how good you've got it!*" Given this new license structure there is almost no reason on earth why even the newest beginner in the hobby wouldn't want to join in the fun.

Now one of the problems I saw with the previous "No Code" tech system was that a lot of folks got their Technician Class license and never went any further with it. The new structure, I hope, will encourage folks to move beyond the entry level Technician Class license to take full advantage of all that amateur radio has to offer. Let's take a walk down this path for a while.

The 5 word per minute code test will remain one of the keys to entry into amateur radio's HF spectrum. This is not just how the FCC wants it, it's also part of International Treaty. Now I am going to impart the most important bit of information I can give you as an Old Ham looking to have you join me on the bands. Let's call it "Uncle Skip's Guide To Passing The 5wpm Code Test Without Any Strain Or Pain." (USGTPT5CTWASOP for short? Never mind!)

1) Obtain a 5 wpm code training course or program from any of the many sources for

such items found in the advertising sections of most radio hobby magazines including *MT*.

2) Once you have the training tape, commit yourself to two things:

First- Promise yourself that you will take the time to study for at least one fifteen minute session every day, but no more than two such sessions each day.

Second - Promise yourself that you will learn just one new letter or number each day. (Don't worry about the prosigns and punctuation at this point in time; for passing the 5 wpm test they are essentially unneeded.) This means you will get through the 26 letters and 10 numbers in just over 5 weeks.

### ■ Uncle Skip's Great Big Secret

(USGBS?!) The mere processes of going through the above steps of learning all the numbers and letters will allow most people to copy code at slightly higher than 5 wpm, usually around 7 or so words per minute. This means when you sit down at the Volunteer Examination Session to take the code test, if you are sure in your mind of all the characters and numbers, you should have absolutely no trouble with the only code test you will ever be asked to take during your amateur radio career!

Thereafter, you can concentrate your efforts on passing the remaining two theory exams and, at your own pace, go on to master Morse code at whatever level you choose through contact with fellow amateurs on the bands. (The only fun way to do Morse code, anyway.)

So then, once you've wet your feet with the "new and improved" Technician Class license and used Uncle Skip's tips and tricks to get the code test over with, you can move on in your ham experience by ascending two more steps: a 35 question exam for the General Class License and a 50 question exam for the coveted Extra Class, the "Black Belt" of amateur radio.

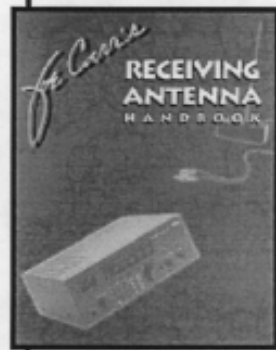
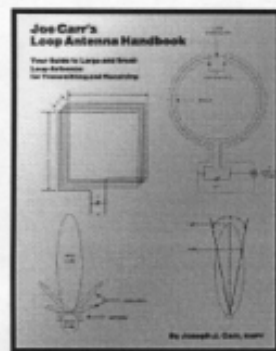
At the time I am writing this, little has been said about the new exam question pools, so you will want to keep one

eye on the amateur radio press or browse on over to [www.arrrl.org](http://www.arrrl.org) for the latest information. The current thinking is that these tests are going to be a bit stronger on the theory side so they will require a good amount of dedication and study. But I can assure you that the rewards are certainly worth the effort.

Now one final word to any of my ham colleagues who might feel that this new re-structured amateur radio license system may indicate a "dumbing down" of ham radio. Let me share something with you all that one of my Elmer's shared with me many years ago. He said, "Anybody can study and pass any test, but passing a test doesn't make somebody a good ham."

Even if you were to go out on April 15, 2000, and pass all three theory exams and the code test in one sitting (it's been done under the "old" rules) that simply gives you a seat at the dinner table, so to speak. And just like at a real dinner table, you will quickly become known by your actions, your attitude and, most importantly, by your manners.

In other words, passing tests is only part of the picture. You still will need to develop your operating skills by getting on the air. But don't worry, my friend, you will find many hams, just like Old Uncle Skip, who will be there to welcome you.



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**Q. Lately I've been hearing about some sort of "zap" gun that stops suspect vehicles by shutting down the engine. How do they work? (Mark Burns, Terre Haute, IN)**

**A.** What you've been seeing is a lot of TV hype about a commercial product that doesn't always work and is very expensive. Basically, it consists of a small trolley which can be launched by a pursuing police vehicle. When the device is properly positioned under the escape vehicle, a high voltage discharge to the car's underbelly – hopefully to the wiring – disables the car's computer system, causing the engine to fail.

But at \$1500 a whack, there are many variables to overcome, including relative speeds and distances of the two vehicles, smoothness and straightness of the road-bed, evasive maneuvers of the target vehicle, make and model of the vehicle, liability in case of accidental fire caused by the flash, misdirection to another (innocent) vehicle, and traffic conditions.

**Q. I have two scanners and a CB mounted in my truck, powered by the cigarette lighter jack. When I accelerate, I get a buzzing sound from all three devices. What is it and how can I cure it? (Bill Black, Buford, GA)**

**A.** If the buzzing sound is a whine which increases in pitch as the vehicle accelerates, it is most likely alternator whine (sounds like "zzzzzzzz"); you can get several filters from Radio Shack to take care of that. The simplest and least expensive consists of a choke coil and filter capacitor (cat. #270-030, \$3.99); they have more expensive units for higher current requirements.

This would be connected between your power source and your radio(s), either between the battery and cigarette lighter jack, or as an external accessory plug-in cord and cigarette lighter jack that you would make up. The instructions are included.

**Q. Virtually the entire world is separated by 24 one-hour time**

**zone intervals. Is Chatham Island (New Zealand) still 12 hrs. 45 min. offset from London? Chris Hynes, Erie, PA)**

**A.** Yes, for its standard time, and offset by 13 hrs. 45 min. in the summer!

**Q. I have noticed electronic fuses marked "30 amps at 250 volts or less." Shouldn't a fuse break at the same current regardless of voltage? (Mark Burns, Terre Haute, IN)**

**A.** Absolutely, but a significantly higher voltage might arc across the melted or vaporized gap of the blown fuse, damaging the equipment which it was designed to protect.

**Q: My wife is constantly talking on our cordless phone until the batteries in the handset go dead. Is it feasible to replace the NiCd (nickel-cadmium) battery pack with a NiMH (nickel metal hydride) battery pack, or can I install a "time-out" timer on my phone? (Mike Elcsisin, Philadelphia, NY)**

**A.** I doubt that either is feasible; NiCds and NiMH take different methods of charging, and I haven't the foggiest notion how or where you would put a time-out circuit on your cordless phone. I've not seen any commercial devices for that purpose, although in May 1999 Bob Parnass had a home-brew project in *MT* for "remote scanner monitoring" over the phone line, which would terminate the connection after a few minutes.

My recommendation would be to check the battery packs in competitive cordless phones and pick one with the highest mAh (milliampere-hour) capacity.

**Q. When will someone come out with a scanner that allows monitoring of digitized communications? (James Henderson, Moulton, AL)**

**A.** The provisions of the Electronic Communications Privacy Act of 1986 (ECPA 86), forbid the manufacture, importation, sale, or possession of any device the primary purpose for which is the interception of encrypted communications. More recent legislation has strengthened criminal penalties for breaking this regulation.

A singular exception would be if the digitization is for spectrum efficiency only, not privacy. For example, the proposed APCO 25 system has several levels of digitization; if the manufacturers and end users agree that some levels are not for privacy, then it is conceivable that scanners would be allowed to decode those levels. Personally, I would be surprised to see that happen.

**Q. I like a velvet-smooth tuning feel on a radio's tuning knob. If I disable the annoying "ratchet-bang" detent tuning mechanism on my portable shortwave radio, will it affect the tuning itself? (Ralph Brunson, Lubbock, TX)**

**A.** The detent settings on the rotary shaft encoder center the positions of the shaft on the proper activation points of the encoder. Disabling the detent mechanism will not alter the electronic operation of the encoder, but the tuning knob will be less stable if left positioned right at a changeover point, so you may see the frequency change by itself, especially if the radio or knob is jarred slightly.

Communications receivers have that same problem, especially if they employ weighted tuning knobs which respond to a healthy spin. It usually helps to have a spring-loaded felt pad against the under surface of the knob or against the shaft to help secure it in position.

Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: [www.grove-ent.com](http://www.grove-ent.com)



Gary Webbenhurst  
ab7ni@arrl.net

## Understanding the Incident Command System

In January, I hinted you could use plastic sheet protectors for the covers of your magazines and soft-cover reference books. A reader has scolded me for throwing away the three-hole strip left over from that operation. Seems you can use them as hole reinforcers on paper copies that suffer from tear and wear in the binder.

You can also buy a *big*, three-inch, three-hole binder and store your favorite magazines by sliding the entire magazine into a sheet protector. You can get a whole year in one big binder. (It works, I checked!) Coupled with the comprehensive end-of-year-index for *MT*, this makes for a powerful research tool!



If you have a desk or tabletop for your radio equipment, you can use a sheet of clear acrylic plastic as a blotter. These are available in many sizes from your local hardware store.

It will keep the soft drink spills and snack foods from ruining the precious lists and papers you store underneath. Thus, it also offers instant access to your important frequency lists, code sheets, etc. If you have the right jigsaw and a little skill, you can make custom radio holders, stands, etc. Oh, the things you can do with plastics!



I often use two or more scanners in the car, so I found that I could run two from the same cigarette plug using a Y connector RS#2731640.

As always, make sure you have properly labeled the power connectors for polarity and voltage. I use identical leads for the Pro scanner series.



*Author uses a 'Y' connector for two Pro scanners and Optoelectronics Scout. All take 9 volts.*



Do you like to spend hours drooling over catalogs of coveted items? Well, I do. It is an enjoyable part of monitoring. Occasionally I break down and purchase something. Here are several sources of catalogs:

*Amateur Electronic Supply (AES):*

800-558-0411 or [www.aesham.com](http://www.aesham.com)

*CRB Research:* 516-543-9169

[www.crbbooks.com](http://www.crbbooks.com)

*Galls:* 800-477-7766 They carry police/fire/EMS gear such as flashlights, illuminated nitewriter pens, lighted clipboards, radio accessories etc.

*Grove Enterprises:* [www.grove-ent.com](http://www.grove-ent.com)

Order Line 800-438-8155

*Maco:* 901-794-9494

[www.majesticcomm.com/maco](http://www.majesticcomm.com/maco)

*MFJ:* 800-647-1800 [www.mfjenterprises.com](http://www.mfjenterprises.com)

*National Association for Search and Rescue:*

703-222-6277 or [www.nasar.org](http://www.nasar.org)

*Optoelectronics:* 800-327-5912 or

[www.optoelectronics.com](http://www.optoelectronics.com)

*Radio Shack:* [www.radioshack.com](http://www.radioshack.com) Visit your local store for a free catalog

*Radio Land:* 800-522-8863 [www.ccrane.com](http://www.ccrane.com)

*Sporty's Pilot Shop:* 800-543-8643 or

[www.sportyscatalogs.com/pilot/pilot.html](http://www.sportyscatalogs.com/pilot/pilot.html)

Sporty's catalog has some very interesting products!

Search carefully: each catalog has several items that can be very useful in our hobby. You can spend many hours browsing the catalogs while monitoring your favorite frequencies. It is cheap entertainment (unless you order something!).



Now to our main attraction: Incident Command System (ICS), sometimes also called Incident Management System (IMS). Do you understand what you hear on your scanner? The terms "Command, CP, LZ, Division A, Treatment" etc., are now commonly used, especially by Fire Departments. This is a management concept that is becoming pretty universal in the public safety sector. In California and many other states its use is mandatory.

ICS is used to unify management, tasks and resources to resolve the current event or emergency. You can research it online at [www.nysemo.state.ny.us/ICS/icsflow.htm](http://www.nysemo.state.ny.us/ICS/icsflow.htm) or schedule a lunch with your favorite fire captain. Professional materials can be purchased through Oklahoma State University at [www.ifsta.org/catalog.html](http://www.ifsta.org/catalog.html) or 800-654-4055. I recommend *Incident Management System for Structural Fires*, item #35669. Cost is \$14. They also have one for Emergency Medical Service (EMS) ICS, item #36005 at \$21.

For General Information:

[www.fema.gov/EMI/is1951st.htm](http://www.fema.gov/EMI/is1951st.htm)

For Medical/EMS:

[www.wmems.org/mciics.htm](http://www.wmems.org/mciics.htm)

For Law Enforcement:

[www.dps.state.ut.us/cem/ICSLaw.htm](http://www.dps.state.ut.us/cem/ICSLaw.htm)

For Public Works:

[www.dps.state.ut.us/cem/ICSPubworks.htm](http://www.dps.state.ut.us/cem/ICSPubworks.htm)

If you are a ham operator and often volunteer your time for Amateur Radio Emergency Services (ARES) or other local public service, a good understanding of ICS is very important, if not mandatory. For more information check [www.arrl.org/field/pscm/sec1ch1.html](http://www.arrl.org/field/pscm/sec1ch1.html) or [www.iex.net/ares/ares.htm](http://www.iex.net/ares/ares.htm)

If you email me a request at [ab7ni@arrl.net](mailto:ab7ni@arrl.net), I will send you a two-page summary of ICS. If you want a 15-page document with job descriptions, I can send you the expanded version. If you email me a comprehensive copy of your local frequencies, I would be most appreciative.



Want another megafreebie for ICS?

Check out the Federal Emergency Management Agency (FEMA) web page at [www.fema.gov/emi/enroll.htm](http://www.fema.gov/emi/enroll.htm). They offer a home study course in ICS. You can download the student manual for the ICS Class. Caution: this is a long download and about 160 pages to print it out. You can also fill out the online registration form and they will send you a copy for free by Priority Mail! Thanks, FEMA.



Final Tip. Test equipment such as SWR (standing wave ratio) analyzers can be very expensive to buy. I often like to test coax, resonance, impedance, or SWR on experimental antennas I have built. I borrow these devices from friends, rather than purchase them. Since you only need these items three or four times a year, I find it better to set up a lending library with close ham/scanner buddies. Thanks to Dave KG0XM! (See picture of test equipment)



*Borrowed test equipment. Thanks a bunch, Dave.*

We love to interact with our readers. If you have tips, ideas, or questions, please free to contact me. Next month, tips on increasing your scanning productivity using the Internet.

# CES (Consumer Electronics Show) 2000

It's that time of year again! Your intrepid scanner columnist has just returned from Las Vegas and the Consumer Electronics Show for the new Millennium (and that's the last time I'll try to use that word). We knew Uniden would be at the show, displaying their line of CBs, radar detectors, marine radios, scanners and of course, phones.

Uniden is the largest manufacturer of cordless phones in the world. Wish there were that kind of demand for scanners, but scanners are a very important part of Uniden's business. And, once again, that was demonstrated this year at CES where Uniden was the ONLY exhibitor displaying scanners or anything related to them.

Each year I reminisce about the good old days when Uniden and Regency had booths practically side-by-side at the CES Show. It was always interesting to watch the dynamics between the two scanner makers. Now, not even Fannon, which still displays its Megaphones, has their line of crystal scanners anymore. (Who remembers those?)

Last year ICOM was supposed to show at the Electronics Show, but their booth space remained an empty hole. This year, WinRadio was listed in the Exhibitor Guide, but we couldn't locate them at all and don't believe they showed up. Radio Shack has never had a booth at CES that we know about. Because they have essentially closed-distribution through their stores, there is no need to attract buyers from WalMart, Target, and other chains and independents large and small, over whom the CES exhibitors fawn.

So, what was Uniden showing as far as scanners? We know what you've been waiting to hear about: the Bearcat BC-780XLT. Because so much time needs to be devoted to that model, this month we'll cover every-



thing else in Uniden's line and we'll leave the 780 for a future issue. Stay tuned.

In handhelds, Uniden was showing the same old line of low-end portables such as the BC-60, BC-80 and BC-120. For newer product, the SC-180 and hot SC-200 Sportcat scanner, were displayed. (See MT's review on p.100 - ed). The SC-200 Sportcat includes CTCSS and DCS operation as well as cloning and even PC download (while not an advertised feature, PC download capability is available through third-party software using the SmartScanner interface).

The multi-trunking BC-245, which has

won the StrongSignals "Radio of the Year" award, was, of course, prominently displayed. The 245 actually sold far better than Uniden could have hoped and that has helped to solidify the importance of trunking in the

marketplace.

On the base side, one of the standard-bearers for the industry continues to be the BC-895 (one of this editor's personal all-time favorites for easy Motorola trunking and the best sensitivity of any scanner around).

The BC-9000 was on the booth's shelves, but, we understand, it is due to be discontinued when the existing stock runs dry. The 9000 was a classic, one of the first alpha units, and we're sorry to see it go. Yet, because it lacks trunking, and because the BC-780 is due to be released soon, retirement was inevitable for the 9000.

The unique Uniden clock-radio line, which we understand to be doing well, was also on display. This line includes a model with just a clock (BC-244); with a clock-radio and no 800 MHz (BC-248); and a clock-radio with 800 MHz (BC-278). This editor will put one of these beauties by his bedside as soon as a trunking model is added to the mix (let's hope!).

In mobile scanners, Uniden is gearing up for the release of the long-awaited BC-780. In the meantime, with the release of the BC-780 scheduled for June/July, Uniden has discontinued another classic, the BC-760. The 760 was great in its day. How many of us, and how many police vehicles, still use 760s and its variants such as the BC-950? There must be a quarter of a million or so that have been in use (just a guess). But, despite its small size and easy-operation, the time has come to put the 760 out to pasture. The radio lacks alpha, DCS capability, computer control, backlit numeral keys, a VFO, and of course, trunking.

Uniden had to include trunking and alpha in a new mobile. Law enforcement, fire officers, and EMS personnel use scanners in their vehicles and can't be expected to know that 156.015 is the secondary channel of the neighboring town. It needs to be clearly spelled out, and that's what the BC-780 will do.

Uniden has also discontinued the BCT-12/StormTracker. This visor-mount pre-programmed scanner was an interesting concept that, perhaps, suffered from the effects of poor receive capability using the inside (on-scanner) antenna. The remaining mobile scanners include the low-end BC-350 (no 800 MHz), and one of the all-time scanner hits, the BCT-7 BearTracker.

The BearTracker comes pre-programmed by state (like the BCT-12) with highway patrol and local police frequencies (you set the two letter state code such as AL for Alabama) and the radio automatically scans the appropriate channels). Unlike its visor-mounted brethren, though, the BCT-7 allows you to enter your own frequencies into the pre-programmed mix. The BCT-7 also comes with CB-Scan (by CB channel), news media scan, weather, and more.



Photo credit: Sarah Hum of The Digital Bits

One brand-new product from Uniden is not a scanner, but still very interesting to us hobbyists: The WX100 Weather Radio. This sleek-looking white device monitors one of 7 weather channels (with alarm) and includes a



backlit alpha display to show the SAME weather alerts with warning and watch indicators. The unit also includes a built-in alarm clock and a 9-volt battery backup. A big speaker and a huge volume control make operation easy and efficient. Best of all, the suggested retail is only \$59.95.

We can only cover Uniden's offerings as they were the only scanner manufacturer to exhibit at CES. However, if other manufacturers wish us to give an overview of their line (by phone or in-person), we'll be glad to write-up a detailed report on their products as well.

Coming soon: A full report (with photos) on the exciting Uniden BC-780XLT.

## Police Call Business License Report

We return to a sampling of the "Beyond" business section of the *Police Call 2000* edition book and new CD-ROM (which are both now available from Grove Enterprises). This month we've taken examples of new and renewed licenses from Florida (Volume 6). That's where I usually wish to be at this time of year, but in this snowless winter (so far), it doesn't seem so important anymore. (Boy, do I miss some good snowstorm monitoring, though!)

As usual, there are some real nuggets of information contained in this section of *Police Call*. Unlike other frequency databases online or on CD, this information has been edited and categorized for easy research and use.

Even if you don't live in Florida or intend to travel to the Sunshine state, be sure to take a quick check through these sections to get a flavor of what *Police Call* has to offer.

Note: The transmitter type information (base/mobile/repeater) is provided in *Police Call*, but not in this report.

Licensee Name	Licensee City	Transmitter	Frequency
<b>Sample Colleges</b>			
Florida State University	Tallahassee		461.8750
Florida State University	Tallahassee		464.5500
Florida State University	Tallahassee	Tallahassee	461.3500
Florida State University	Tallahassee	Tallahassee	461.5500
Florida State University	Tallahassee	Tallahassee	463.7250
Gulf Coast Community College	Panama City	Panama City	464.4250
Gulf Coast Community College	Panama City	Panama City	464.6750
Harbor Brch Oceanographic Inst	Fort Pierce	Ft Pierce	452.8500
Hillsborough Comm College	Tampa	Davis Isla	462.0000
Hillsborough Comm College	Tampa	Plant City	464.4000
Hillsborough Comm College	Tampa	Tampa	461.2500
Hillsborough Comm College	Tampa	Tampa	461.5000
Hillsborough Comm College	Tampa	Tampa	463.4250
Indian River Community College	Fort Pierce	Fort Pierce	154.5400
Jacksonville University	Jacksonville	Jacksonvil	464.9750
Lake City Community College	Lake City	Lake City	464.9500
Lake Sumter Community College	Leesburg		464.3250
Lake Sumter Community College	Leesburg		464.3750
Lake Sumter Community College	Leesburg		464.5750
Lake Sumter Community College	Leesburg		464.6750
Manatee Community College	Bradenton	Bradenton	461.1750
Manatee Community College	Venice		151.7750
Manatee Junior College	Bradenton	Bradenton	464.3000
Miami Dade Community College	Miami		151.7150
Miami Dade Community College	Miami		151.7450
Miami Dade Community College	Miami		464.5000
Miami Dade Community College	Miami	Miami	451.5000
<b>Sample Schools</b>			
Haile Middle School	Bradenton	Bradenton	461.1750
Haines City High School	Haines City		33.4000
Haines City High School Athletic	Haines City		151.6550
Hallandale High School			462.8875

TrunkTrac, the first, and one of the most sophisticated trunk tracking technologies available, is now even better. New pricing and additional features make TrunkTrac your best choice if you're serious about tracking Motorola Type I, II, III, and Hybrid systems. TrunkTrac now supports the BC895XLT, PCR1000, R7000, R7100, R8500, R9000, and the RS Pro 20xx series with an OS456/535 board installed.

Competing products cost more, don't decode the control channel, can't deal with Type I fleet maps, and won't properly decode many Type II talk groups. TrunkTrac's patented technology let's you do all that and much more. TrunkTrac consists of easy to use menu driven software, an FCC Class B approved signal processing board you plug into an ISA slot in your PC, a serial interface, and a discriminator buffer for your scanner. Everything you need, including cables, is supplied. With TrunkTrac you'll have access to Private Call and Interconnect activity and can follow up to four systems at once. Any combination of VHF/UHF/800/900 MHz systems, including FED-SMR trunking, is supported. TrunkTrac lets you assign a 35 character alpha tag (up to 1000/system) to all IDs. You can set Lockouts, Personality Files, Scan Lists, and much more. TrunkTrac lets you log system activity to an ASCII file for database import and traffic analysis. We think you'll like TrunkTrac so much it comes with a 30 day money back guarantee. And For a limited time, when you purchase TrunkTrac, we will install the discriminator mod in your scanner for free. **TrunkTrac ver 5.2.....\$297.95**

Scanner Master PO Box 428, Newton Highlands, MA 02161 1-800-722-6701  
www.scannermaster.com



Hallmark Elementary School	Pensacola	151.7150
Hamilton County School Board	Jasper	151.8350
Hammocks Junior High	Miami	151.8950
Haney Vocational Technical Ctr	Panama City	464.7750
Harbor City Elementary School	Melbourne	151.7150
Harbor City Elementary School	Melbourne	154.6000
Hawthorne High School	Hawthorne	154.6000
Hendry County School Board	Clewiston	151.6850
Henry Grady Elementary School	Tampa	461.5625
Hialeah Jr High School	Hialeah	154.5700
Hialeah Senior High School	Hialeah	464.8250
Highland Oaks Jr High	Mimai	151.7450
Highlands County School Board	Sebring	151.7450
Highlands County School Board	Sebring	469.4625
Highlands County School Board	Sebring	469.5500
Highlands County Schools	Sebring	469.5500
Hillsborough Co School Board	Tampa	33.4000
Hillsborough Co School Board	Tampa	154.5700
Hillsborough Co School Board	Tampa	154.6000
Hillsborough Co School Board	Tampa	461.0750
Hillsborough Co School Board	Tampa	464.7750
Hillsborough District Schools	Thonotosassa	464.1000
Hillsborough High School	Tampa	464.7750

## Sample Government

(This is a very interesting section. It shows there are tens of thousands of city, county and state licenses for government agencies on the business band radio frequencies. Be sure to check these listings out closely for channels as mundane as pagers and as interesting as Housing Authority security and much more!)

Broward, County Of	Fort Lauderdale	464.5625
Broward, County Of	Fort Lauderdale	464.9750
Broward, County Of	Fort Lauderdale	467.8375
Broward, County Of	Fort Lauderdale	467.8875
Charlotte, County Of		33.4000
Coral Gables, City Of	Coral Gables	451.7875
Davie Town Of	Davie	939.6375
Davie Town Of	Davie	939.6500
Davie Town Of	Davie	939.6625
Davie Town Of	Davie	939.6750
Davie Town Of	Davie	939.6875
Deerfield Beach Housing	Deerfield Beach	154.5700
Defuniak Springs, City Of	Defuniak Springs	451.7875
Delray Beach Housing Authority	Delray Beach	154.6000
District Board Of Trustees	Pensacola	464.9750
Flagler County Council	Palm Coast	461.3000
Florida Keys Aqueduct Authority	Key West	153.2750
Florida Keys Aqueduct Authority	Key West	159.7050
Florida Keys Aqueduct Authority	Key West	153.5450
Florida Keys Aqueduct Authority	Key West	153.5750
Florida Keys Aqueduct Authority	Key West	153.6350
Florida Keys Aqueduct Authority	Key West	159.6600
Florida Keys Aqueduct Authority	Key West	159.9600
Florida Keys Aqueduct Authority	Key West	160.1400
Florida Keys Aqueduct Authority	Key West	153.4100
Florida Keys Aqueduct Authority	Key West	153.5150
Florida Keys Aqueduct Authority	Key West	153.6950
Fort Lauderdale Airport	Dania	464.8250
Godsden Correctional Institution	Quincy	462.1500
Hillsborough, County Of	Tampa	452.4250
Hillsborough, County Of	Tampa	452.6250
Hillsborough, County Of	Tampa	452.7000
Hillsborough, County Of	Tampa	452.8500
Housing Authority Of Bradenton	Bradenton	452.6500
Immokalee Non Profit Housing Inc	Immokalee	466.9250
Jacksonville Port Authority	Kissimmee	466.0625
Jacksonville Port Authority	Kissimmee	468.4125
Jacksonville Port Authority	Kissimmee	469.7625
Johns Island Water Management	Vero Beach	151.7750
Lake Park Volunteer Firefighters	Lake Park	461.1625
Lake Park Volunteer Firefighters	Lake Park	461.5875
Lake Park Volunteer Firefighters	Lake Park	466.6875
Lake Worth Drainage District	Delray Beach	451.9500
Okaloosa County Council On Aging	Fort Walton Bea	461.1500
Orange, County Of	Orlando	937.7000
Orange, County Of	Orlando	937.7125
Orange, County Of	Orlando	937.7250
Orange, County Of	Orlando	937.7375
Orange, County Of	Orlando	937.7500
Orlando Housing Authority	Orlando	463.5000
Pahokee Housing Authority	Pahokee	464.1125
Palm Bay, City Of	Palm Bay	461.9500

## Sample Miscellaneous Agencies

(Another fascinating section filled with licenses for all sorts of agencies. Check these listings out closely for some great freqs that just begged to be monitored.)

Dade Juvenile Center	Miami	North Miam	939.6375
Dade Juvenile Center	Miami	North Miam	939.6500
Dade Juvenile Center	Miami	North Miam	939.6625
Dade Juvenile Center	Miami	North Miam	939.6750
Dade Juvenile Center	Miami	North Miam	939.6875
Design Center Of The Americas	Dania	Dania	461.3000
Devereux Foundation	Melbourne		154.6000
Devereux Foundation	Melbourne	Melbourne	461.1750
Devereux Foundation	Melbourne	Melbourne	461.1875
Eckerd Youth Development Center	Okeechobee	Okeechobee	463.5750
Egypt Shrine Temple			151.6250
Embry Riddle Faa Center	Palm Coast		151.9250
Embry Riddle Faa Center	Palm Coast		157.5600
Everglades Recycling			461.0500
Evergreen Cemetery Co Inc	Bushnell	Bushnell	852.8625
Flagler County Council On Aging	Palm Coast	Bunnell	461.3000
Flagler County Humane Society	Palm Coast	Bunnell	461.1000
Florida Bar	Tallahassee	Tallahassee	464.8750
Florida Independent Automobile	Orlando		154.6000
Florida Sheriffs Youth Ranches	Inglis		151.8050
Florida Waterway Management	Fort Lauderdale	West Palm	936.1750
Gainesville Alachua County Reg	Gainesville		464.5500
Gator Human Services	Florida City	Florida Ci	159.9750
George Stone Area Vocational Ctr	Pensacola	Pensacola	151.9550
Goodwill Industries	Tallahassee		460.6500
Gospel Projects Inc	Milton		154.5700
Gospel Projects Inc	Milton		154.6000
Gulfridge Council Bsa	Tampa		151.6250
Haines City Citrus Growers Assn	Haines City	Haines Cit	451.9500
Hallandale Adult Community Ctr	Hallandale		463.2625
Hallandale Adult Community Ctr	Hallandale		464.4875
Hamilton County Landfill	Jasper	Jasper	151.7450

## Sample Hotels

Beach Hotel Associates	Miami Beach		463.9125
Beach Hotel Associates	Miami Beach		464.8375
Beach Hotel Associates	Miami Beach		466.2375
Beachcomer Inn	Daytona Be		151.8050
Beachmark Inn Inc	Fort Walton Bea	Fort Walton	464.7500
Bellevue Mido Resort Hotel	Clearwater		151.6550
Best Western Buena Vista Suites	Lake Buena Vist		469.5125
Best Western Buena Vista Suites	Lake Buena Vist		469.5375
Best Western Buena Vista Suites	Lake Buena Vist		469.5625
Best Western Buena Vista Suites	Lake Buena Vist		469.5875
Bikini Beach Motel	Panama City		151.8050
Biltmore Hotel	Coral Gables		466.4875
Blue Tree Resort	Orlando		463.6000
Blue Tree Resort	Orlando		464.4000
Blue Water Bay Resort Ltd	Niceville		467.8625
Boardwalk Beach Resort	Panama City Bea		469.8750
Boca Raton Hotel & Club	Boca Raton		461.7375
Boca Raton Hotel & Club	Boca Raton		463.4875
Boca Raton Hotel & Club	Boca Raton		463.6375
Boca Raton Hotel & Club	Boca Raton	Boca Raton	157.7400
Boca Raton Hotel & Club	Boca Raton	Boca Raton	463.6750
Boca Raton Hotel & Club	Boca Raton	Boca Raton	464.3750
Boca Raton Hotel & Club	Boca Raton	Boca Raton	464.9500
Boca Raton Marriott	Boca Raton		462.0625
Boca Raton Resort & Club	Boca Raton	Boca Raton	452.6250
Bon Air Motel Inc	Saint Petersbur		154.5700
Bonaventure Resort & Spa	Fort Lauderdale	Fort Laude	464.3750
Bonaventure Resort & Spa	Fort Lauderdale	Fort Laude	464.8750
Breakers Of Fort Walton	Fort Walton Bea	Cantonment	464.0250
Breakers Palm Beach	Palm Beach		465.0000
Breakers Palm Beach	Palm Beach		464.4750
Breakers Palm Beach	Palm Beach	Palm Beach	461.8250
Breakers Palm Beach	Palm Beach	Palm Beach	462.1125
Breakers Palm Beach	Palm Beach	Palm Beach	463.5000
Breakers Palm Beach	Palm Beach	Palm Beach	463.9375
Breakers Palm Beach	Palm Beach	Palm Beach	464.1125
Breakers Palm Beach	Palm Beach	Palm Beach	465.0000
Breakers Palm Beach	Palm Beach	West Palm	461.7500
Breakers Palm Beach	Palm Beach	West Palm	461.7875
Breakers Palm Beach	Palm Beach	West Palm	463.4625
Breakers Palm Beach	Palm Beach	West Palm	464.5375
Breckenridge Resort Hotel	Saint Petersbur	Saint Pete	151.8350
Bright Star Motel Company Inc	Panama City Bea		461.8125
Buckhead Hotel Management Co Inc	Orlando		154.5700
Buckhead Hotel Management Co Inc	Orlando		154.6000
Buena Vista Palace	Lake Buena Vist	Lake Buena	158.4600
Buena Vista Palace	Lake Buena Vist	Lake Buena	464.4250
Buena Vista Palace	Lake Buena Vist	Orlando	463.7250
Buena Vista Palace	Lake Buena Vist	Orlando	464.3250

# Scanner Logs



## SCANNING REPORT

**Larry Van Horn**

[larry@grove-ent.com](mailto:larry@grove-ent.com)

### VHF Low-band Intercepts from Ron in Maryland

34.410 White Sands Missile Range, NM (PL Unknown)  
34.850 White Sands Missile Range, NM (123.0 Hz PL)  
36.510 White Sands Missile Range, NM (151.4 Hz PL)

### Military Aircraft Logs from Jack NeSmith in Florida

247.000 Fort Stewart, GA Callsign — Marine Radio  
267.500 FACFACS Jacksonville Callsign — Sealord working  
Airwolf 412  
277.800 U.S. Navy Fleet Common (Nationwide allocation-LVH)  
344.000 NORAD Callsign — Oakgrove  
348.300 Live Oak MOA, FL  
362.350 FAA Lowell, FL Callsign — Roman 44 (Flight of 2 aircraft)  
364.200 NORAD AICC Callsign — Oakgrove (Nationwide-LVH)  
375.100 Tyndall AFB, FL

### Patrick AFB, Cape Canaveral and NASA-KSC

Courtesy of Al Stern, Satellite Beach FL

For those who may travel to this area and want to listen to Patrick, Cape Canaveral Air Station, or NASA-Kennedy Space Center Shuttle Landing Facility (SLF) communications, here are the major freqs to plug in.

#### Patrick AFB Aero Frequencies

Tower	133.75	348.4
Approach South	132.65	241.425
Approach North	134.95	241.425
Ground Control	124.35	335.8
Clearance Delivery	118.4	289.4
Pilot to Dispatcher (PTD)	122.85	372.2
Command Post	138.3	383.0
Weather	344.6	
Fuel Operations	165.1625	
Flight Line	149.3	
920 Rescue Squadron Maintenance	148.095	
920 Rescue Squadron Operations	321.0	

#### Cape Canaveral Air Station and NASA-Kennedy Space Center

CCAS Tower	118.625	393.0 (Skid Strip)
Cape Control	133.8	
Cape Radio	11.780 kHz	
KSC Tower	128.55	284.0 (SLF)
KSC-SLF Ground	121.75	

### City of New Orleans, Louisiana, trunk system

Monitored by Larry Van Horn during a recent trip and published just in time for the annual Mardi Gras celebration in New Orleans.

#### EDACS—Main System WPD 285

frequencies in LCN order

01 866.3375  
02 866.4125  
03 866.4375  
04 866.7375  
05 866.8750  
06 866.9250

07 867.2125  
08 867.2375  
09 867.2875  
10 867.5375  
11 867.5750  
12 867.6875  
13 867.8875  
14 867.9500  
15 867.9750  
16 868.1375  
17 868.2250  
18 868.2750  
19 868.4000  
20 868.4500  
21 868.6000  
22 868.6750  
23 868.7500  
24 868.9250

#### EDACS—Irish B System WPD 285

frequencies in LCN order

01 866.1875  
02 866.7625  
03 867.3875  
04 868.0875  
05 868.7000

#### EDACS—Kenner System WPD 285

frequencies in LCN order

01 866.2125  
02 866.9625  
03 867.4500  
04 868.2500  
05 868.8750  
06 866.4625  
07 866.7125  
08 867.8000  
09 868.5000

#### New Orleans Police Department Talk Groups

05-041	D-1 (District 1: Downtown Business District-Central)
05-042	D-2 (District 2: West of Louisiana Avenue/Toldano Street/Pametto Avenue)
05-043	D-3 (District 3: North of Gentilly Road)
05-044	D-4 (District 4: West Bank/Algiers)
05-045	D-5 (District 5: East of Esplanade Avenue; south of Gentilly Road)
05-046	D-6 (District 6: Between Toledano Street/Louisiana Avenue and the Ponchartrain Expressway)
05-047	D-7 (District 7: East of the Industrial Canal and north of the Outfall canal)
05-050	D-8 (District 8: French Quarter)

05-081 Dispatch 1 (Districts 1 and 8)  
05-082 Dispatch 2 (District 2)  
05-083 Dispatch 3 (Districts 3 and 7)  
05-084 Dispatch 4 (District 4)  
05-085 Dispatch 5 (District 5)  
05-086 Dispatch 6 (District 6)

05-087 Talk District 1

05-090 Talk District 2  
05-091 Talk District 3  
05-092 Talk District 4  
05-093 Talk District 5  
05-094 Talk District 6  
05-095 Talk District 7  
05-096 Talk District 8

05-126 City wide 1/Talk 1  
05-127 City wide 2/Talk 2  
05-130 Special Events 1  
05-131 Special Events 2  
05-132 Special Events 3

06-001 Jefferson Parish SO Dispatch 1 (link)  
06-002 Jefferson Parish SO Dispatch 2 (link)  
06-005 St. Bernard Parish SO Dispatch (link)  
06-013 Jefferson Parish SO Talk (link)

#### New Orleans Fire Department Talk Groups

08-041	Dispatch
08-043	Operations
08-045	Information
08-046	Fire ground 9
08-047	Fire ground 10
08-050	Haz Mat 1
08-081	Fire ground 2
08-121	Fire ground 3
09-001	Fire ground 4
09-041	Fire ground 5
09-081	Fire ground 6
09-121	Fire ground 8

#### System-wide Public Safety System Talk Groups

11-006	Public Safety Talk 1
11-007	Public Safety Talk 2

#### EMS/Medical Ambulance Talk Groups

12-041	Dispatch 1 Fire Department First Responders
12-042	Dispatch 2 EMS Dispatch
12-043	Dispatch 3
12-044	Dispatch 4
12-045	Dispatch 5
12-051	Medical Control 1
12-052	Medical Control 2
12-053	Talk 1
12-054	Talk 2

#### Hospital Talk Groups

13-041	Charity Hospital
13-042	Methodist Hospital
13-043	Jo Ellen Smith Hospital
13-044	Tulane Medical Center
13-045	Lakeland Hospital

If you live in the Baton Rouge area and need frequencies for the Mardi Gras season be sure to stop by David Hitchner's scanning website at <http://members.home.net/hitchner/>.

To all our friends in the New Orleans area, have a safe and happy Mardi Gras season. *Laissez le bon temps rouler.*

## ALE: The Future Arrives

For at least a couple of years, I've been talking about Automatic Link Establishment (ALE). This is how long it's been specified in most US and allied government and military contracts for new radio systems on HF (high frequency, 3 to 30 MHz). In nearly all cases, the goal has been to simplify HF for its users, eliminating the uncertainty and labor demands that have made it lose out so badly to satellites.

Well, this is the year ALE happened, and all over the world. It's suddenly impossible to tune HF without hearing its distinctive sound. This is because it works, raising the percentage of successful HF calls from around 35 per cent to 80 or 90, on a par with the dreaded satcom.



Unlike satellite links, though, ALE doesn't replace anything. By definition, it's a control system for existing radios in the upper sideband (USB) mode. While ALE can, of course, be designed into a new system, it can also be added on, via a computerlike, external controller.

ther way, once this automatic radio watch completes the link, control goes back to human operators. "Normal" voice or digital traffic follows, on the same frequency or an adjacent one.

### Monitoring ALE

ALE may be the most complicated radio system ever designed. It's spelled out, more or less, in a 900-page wad of opaque techspeak called MIL-STD (for Military Standard) 188-141A. However, ALE hides most of its complexity from the user, making simple listening a snap.

ALE's 8-tone, sequential modem produces a cyclic gurgle that you've probably heard already. It's also been described as a turkey gobble, or a water bubble. You're hearing the short, repeating "words"



that pass data. Extensive redundancy, voting, and error correction fight HF's inherent noise and fading. It's little short of amazing to watch a barely audible signal fill up the computer screen.

To extract any meaningful information beyond ALE's mere presence, you're going to need a controller of your own. Users of the IBM compatible personal computer (PC) are in luck. Charles Brain, G4GUO, a British ham, has created PC-ALE, a rather amazing "freeware" program that emulates a full-featured ALE controller in Windows.

PC-ALE was created as a personal learning exercise, and it is very much an unfinished product. It has no documentation. Though a few

hams tried ALE, the program was not well known. Charles dropped its support in favor of paying projects. Now, though, it's so popular that his download site, [www.chbrain.dircan.co.uk](http://www.chbrain.dircan.co.uk), is regularly suspended for exceeding its daily transfer limits.

PC-ALE is definitely at the user's own risk, though few of the bugs and weird errors affect receiving. The only set-up is to make sure that "Display Sound," "Listen Calls," and "Wild" are checked, and that "Trace" isn't.

That's it. Plug the receiver's recording output into your PC's mike input, check the level, pick a few ALE frequencies, and wait. And wait some more, perhaps for hours. ALE transmissions are unpredictable and tend to come in bunches. This is a good use for your radio when you're away from it, since the computer will save everything it finds.

If your receiver can be computer controlled (and most new ones can), it may be capable of a true ALE scan with this program. People doing this become spoiled for anything else. Unfortunately, its setup varies for every radio, and it's way beyond the scope of this column.



### 'Tis and 'Twas

Eventually, you'll hit on a signal and your screen will fill up. Success! The result, though, can look a bit cryptic. What is this stuff? Each line on the PC-ALE screen records one transmission, with up to eight standard elements. First is usually Coordinated Universal Time (UTC), calculated from your computer's clock. Next is the channel, which you can disregard unless you're scanning.

After this comes the transmission type, usually SOUND. These are automatic propagation tests, sent by all stations on all frequencies. Another transmission is the call, labeled TO. Like most calls, it's repeated, often many times. There are also all-calls and group calls, though so far these seem rare.

Other elements vary, and get rather technical. One is the ALE "address" of the station making the sound, or that of the station being called. In basic ALE, these addresses look like callsigns, with any string of letters and numbers up to six characters long. In the more advanced system, ALE-II, they can be much longer. Most ALE addresses, though, tend to be three characters.

A calling station will identify itself with a TIS prefix ("this is"). A sounding station will signal TWAS or TWS ("this was"), meaning, "I'm gone, no action needed."

Finally, there's a link-protection (LP) level, which will always be "AL0," because anything higher is encrypted and won't display, no matter how well it's received. Often, we'll also see computed bit/error and signal/noise ratios, both ranked 0 to 30, higher being better. ALE controllers keep a database of these for every net member and frequency, providing link quality assessment (LQA).

This is really all you need to know. Happy ALE-ing!





Hugh Stegman

## Abbreviations used in this column

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
BRV	Booster Recovery Vehicle
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
CIA	Central Intelligence Agency
Comm	Communications
CP	Command Post
CW	Morse code telegraphy ("Continuous Wave")
DEA	Drug Enforcement Agency
DOD	Department of Defense
EOC	Emergency Operations Center
FAPSI	Federal Agency for Government Communication and Information
FEMA	Federal Emergency Management Agency
GANTSEC	Greater Antilles Section
JSTARS	Joint Surveillance Target Attack Radar System
LDOC	Long Distance Operational Control
LSB	Lower Sideband
MARS	Military Affiliate Radio Service
MFA	Ministry of Foreign Affairs
NASA	National Aeronautics and Space Administration
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission
SECURE	State Emergency Capability Using Radio Effectively
SHARES	Shared Resources
SPAR	Special Air Resources
STS	Space Transportation System ("Space Shuttle")
UK	United Kingdom
Unid	Unidentified
US	United States
USN	US Navy
VHF	Very High Frequency
VIP	Very Important Person
VOLMET	Aviation weather observations
Y2K	1/1/2000 computer changeover

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

- 2474.0 PBC-Dutch navy, Goeree, RTTY bulletins at 2039. (Ary Boender-Netherlands)
- 2518.0 Bravo Whiskey-US Navy, with several stations using single-letter calls, all in tactical data link ("Link-11") coordination net, at 0704. (Tom Severt-KS)
- 2639.0 SPS-Witowo Radio, Poland, with CW markers at 2041. (Boender-Netherlands)
- 2790.0 FUE-French navy, Brest, RTTY test at 2029. (Boender-Netherlands)
- 3167.5 "J-4-B"-Possible US military, working "L-4-I" at 0627. (Paul Bunyan-MO)
- 3764.4 PBB-Dutch navy, Den Helder, RTTY bulletins at 2036. (Boender-Netherlands)
- 4027.0 Cuban "Cut" numbers station, CW, at 0300 and 1100. Cuban "Atencion" numbers station, AM, different day at 1100. (Camillo Castillo-Panama)
- 4273.0 SAA-Karlskrona Radio, Sweden, with CW markers at 1740. (Boender-Netherlands)
- 4274.0 GBK-Portishead Radio, England, with CW markers at 1737. (Boender-Netherlands)
- 4583.0 DDK2-Hamburg Meteorological, Germany, RTTY test at 2112. (Boender-Netherlands)
- 4739.0 Pelican 67-US drug interdiction P-3C, working Fiddle, Jacksonville, FL, at 0458. (Ron Perron-MD)
- 4742.0 Architect-Royal Air Force, UK, working Ascot 3300, at 0323. (Perron-MD)
- 4840.0 Sunflower 142-Probable KS Army National Guard armory, work-

- ing Sunflower 143, similar, in LSB at 1451. (Bunyan-MO)
- 5190.0 Cape Radio-NASA Solid Rocket Booster recovery net, part of STS-103 launch, at 0059. (Severt-KS) *Liberty Star*-NASA Booster Recovery Vessel, STS-103 launch, making signal checks with Cape Radio, FL, and *Freedom Star*, recovery vessel for the other booster, at 1518. (Allan Stern-FL)
- 5211.0 WGY 908-FEMA alternate net control, CO, activating National Emergency Coordinating Net for Y2K changeover, at 0333. WGY 912, regular FEMA net control, VA, taking check ins at 0522. (Perron-MD)
- 5277.0 Herc 17-US drug interdiction, working "61A" and Panther (DEA/Customs, Bahamas) in pursuit of a drug running speedboat, at 0751. (Jeff Haverlah-TX)
- 5746.0 Unid-English language female voice, sounded like Mossad, Israel, jammed, at 1943. (Gary Cohen-China)
- 5841.0 Coast Guard 63A-US Coast Guard helicopter, working Panther (DEA/Customs, Bahamas), at 0214. (Perron-MD)
- 6502.0 TBB6-Turkish navy, Ankara, calling TBDJ (all Turkish warships) in CW at 1704. (Boender-Netherlands)
- 6637.0 Miami Radio-LDOC, taking departure report from Amerijet 882 enroute to San Juan, PR, at 0319. (Perron-MD)
- 6640.0 New York Radio, discussing possible fuel leak with United 998, at 0308. (Severt-KS)
- 6655.0 CIO2-Mossad, Israel, English callup in AM, at 0150. (Castillo-Panama)
- 6743.0 Gold 17-Unknown military station, speaking French, English, and an African language, at 0449. (Perron-MD)
- 6768.0 Cuban "Cut" numbers station, CW, at 1200 and 1300. (Castillo-Panama)
- 6784.0 Cuban "Cut" numbers station, CW, at 1300. (Castillo-Panama)
- 6797.0 Cuban "Cut" numbers station, CW, at 1200 and 1300. (Castillo-Panama)
- 6815.6 GANTSEC-US Coast Guard Greater Antilles Section, PR, working aircraft "C-3-H," at 0354. (Perron-MD)
- 6854.0 Cuban "Cut" numbers station, CW, at 1200 and 1300. Cuban "Atencion" numbers, AM, at 0300. (Castillo-Panama)
- 6868.0 Unid-Male English language "numbers" in repeated 5-figure groups, at 0317. (Castillo-Panama) *An old Cuban frequency, but this format sounds more Russian.* -Hugh
- 6933.0 Cuban "Cut" numbers station, CW, at 1200 and 1300. (Castillo-Panama)
- 7477.0 "Springfield"-Probably Illinois SECURE emergency station, in voice after ALE callup, at 1734. (Bunyan-MO)
- 7919.0 Spar 65-US Air Force VIP flight, given this frequency (F-360) as primary by Andrews, at 2352. (Perron-MD)
- 8040.0 GFA-Bracknell, England, weather fax charts at 0520. (Severt-KS)
- 8122.0 Darwin Control-Australian Navy, working Kilo Juliet at 1335. (Perron-MD)
- 8300.0 "NewStar"-AM "numbers" station, probably Taiwan, usual happy female voice with 4-figure groups, warble jammer in background, at 1400. (Severt-KS)
- 8303.3 LOR-Argentine Navy, Puerto Belgrano, RTTY Spanish language weather, at 0605. (Bob Hall-RSA)
- 8453.0 RFFME-French Navy, Paris, RTTY test with FAAA, at 0849. (Boender-Netherlands)
- 8552.5 CTP-Portuguese Navy, Lisbon, with RTTY coded message at 0615. (Hall-RSA)
- 8682.0 US Coast Guard CAMSPAC, Pt. Reyes, CA, with very clear weather fax at 0321. (Severt-KS)
- 8892.0 CIA Counting Station, numbers in Spanish at 0420. (Perron-MD)
- 8971.0 Fiddle-US drug interdiction, Jacksonville, FL, with several clear and secure attempts to work Cardfile 42, a P-3C, at 1802. (Perron-MD)
- 8974.0 Townsville-Australian Air Force, working unid aircraft at 1319. (Perron-MD)
- 8980.0 Coast Guard 2112-US Coast Guard helicopter, in patch via CAMSLANT to Miami Air Ops, regarding refueling time at 2112. (Perron-MD)
- 8983.0 Stingray 31-US drug interdiction aircraft enroute to Cayman Islands, setting radio guard with CAMSLANT at 0028. (Perron-MD)

- 8992.0 FAP Lisboa-Portuguese Air Force, Lisbon, working unid aircraft at 0124. (Perron-MD) "International Airport"-Unknown station asking US Air Force McClellan Global for status of aircraft enroute to Antarctica, at 0201. (Stern-FL) Moonbeam-US airborne CP also heard in FEMA Y2K nets, patch through Hickam regarding "Rattlesnake Canyon," at 0519. (Haverlah-TX)
- 9007.0 Canforce 4005-Canadian Forces, getting weather from Trenton Military, at 0246. (Perron-MD)
- 9016.0 WAR 46-US military Joint Alternate CP, in large net with Strength, Wild Man, and Lock Box, also on Z190 (10204), at 2112. (Haverlah-TX)
- 9023.0 Spar 65-US Air Force VIP flight, sent to 7919 kHz by Andrews, at 2342. (Perron-MD)
- 9057.0 PACOM 01-US Air Force C-135E, calling Andrews VIP on Mystic Star F-395, no joy at 0025. (Bunyan-MO)
- 9062.0 Cuban "Cut" numbers station, CW, at 0517. (Sevart-KS)
- 10345.0 Cuban "Cut" numbers station, CW, at 0300. (Castillo-Panama)
- 10355.0 4XZ-Israeli intelligence, with 5-figure CW "numbers" groups, possibly a new frequency, at 1420. (Sevart-KS)
- 10493.0 WGY 912-FEMA National Emergency Coordinating Net control station, VA, taking many Y2K check ins, including WGY 947 (Iowa EOC), WGY 911 (FEMA, MA), WGY 9002 (FEMA Region 2 mobile), WGY 907 (FEMA Region 7, MO), WGY 964 (Mississippi EOC), KGA 913, WGY 915 (National Comm. System, DC) and Moonbeam (airborne CP), at 1400. (Perron-MD) WGY 912, signal check with WGY 913, at 2227. (Haverlah-TX)
- 10648.0 Gate 22-US Air Force, in clear and secure voice checks with Andrews AFB, also tried a remote at Offutt AFB, NE, at 0200. Pacom 01-US Air Force C-135E, on the ground in MO, making a signal check with Andrews on Mystic Star F-184, at 2217. (Bunyan-MO)
- 10780.0 DOD Cape-US Department of Defense, Cape Canaveral Air Force Station, FL, working several stations for STS-103 launch, at 0045. (Sevart-KS) *Liberty Star*-NASA Booster Recovery Vessel, calling the Booster Recovery Director and BRV *Freedom Star*, sent by Cape Radio to 5190 kHz, at 1515. (Stern-FL)
- 10944.6 CFH-Canadian Forces, Halifax, with RTTY callup and channel availability bulletins, at 0556. (Hall-RSA)
- 11053.0 Spar 65-US Air Force VIP flight, working Andrews at 1735. (Stern-FL)
- 11108.0 WGY 908-FEMA, CO, working WGY 998, at 1515. (Bunyan-MO)
- 11175.0 CA 326-Probably a P-3 on Western drug interdiction, went to 11181 at 0328. "C-130629"-Aircraft finally answered by Andrews Global, after repeatedly calling "MacDill Radio" (closed for years), at 1354. Reach 7044-US Air Force, following Air Force One back to Andrews, at 1757. Spooky 42-US military C-130 gunship, weather from Andrews at 1816. Mizzen 1-MD Air National Guard aircraft enroute to Antilles, at 2000. (Stern-FL) Razor Back-US military, working station sounding like KAG 86, then Shadow Ops, at 1940. Navy 49676-US Navy VIP, in patch via Thule to Andrews VIP for a new frequency, because F-290 (8026) didn't work. Given F-268 (7325), which didn't work either because Radio Sweden was there, at 2223. Finally given F-311 (11220) and F-461 (13211) at 2232. (Perron-MD)
- 11178.0 Hotel 01-Dutch Navy, Curacao, working patrol boat Charlie 2, deciding a speedboat being tracked was smuggling whiskey and cigarettes into Venezuela, not their responsibility, at 2152. (Perron-MD)
- 11181.0 CA 326-US military P-3C, Western drug interdiction, at 0430. (Stern-FL) Broad Beam-US military, in net with Bean Pole, Burlly Boy, and White Ash, clear and secure, started at 1608. (Haverlah-TX)
- 11232.0 UN 399-Canadian Forces aircraft on United Nations mission, getting weather for Tenerife and Santo Porto, Portugal, from Trenton Military, at 1413. (Perron-MD)
- 11306.0 Flight Support-LDOC, Lima, Peru, working American Airlines flights 905 and 907 from Miami to South America, at 0432. (Perron-MD)
- 11957.0 Unid-ALE burst, probably FEMA, at 1735. (Bunyan-MO)
- 12180.0 FAPSI, Russia, with RTTY sign-on at 1317. (Boender-Netherlands) *All these Russian RTTY and CW circuits went crazy with traffic after Yeltsin resigned. -Hugh*
- 13200.0 Turkish Air Force 187-Aircraft attempting patch to weather office via US Air Force Offutt Global, dropped patch when he heard Offutt on VHF, at 1719. (Perron-MD)
- 13257.0 Architect-Royal Air Force, UK, with VOLMET at 1922. Trenton Military-Canadian Forces, passing African weather to same United Nations mission as on 11232, at 2006. (Perron-MD)
- 13282.0 Hong Kong VOLMET, with weather every hour plus 15 and 45. (Cohen-China)
- 13291.0 Gander Radio-North Atlantic air route control, taking Air Canada 081's position at 1456. (Perron-MD)
- 13356.0 Air Jamaica Dispatch-Ground station working Air Jamaica 032, at 1855. (Perron-MD)
- 13510.0 CFH-Canadian Coast Guard, Halifax, with weather fax charts at 1502. (Sevart-KS)
- 13530.0 KAWN-US Air Force Digital Weather Switch, Aviation Weather Network, probable relay from USN Saddlebunch Key, RTTY weather codes at 1530. (Hall-RSA)
- 14396.5 KGD 34-US National Coordinating Center, Arlington, VA, National Communications System liaison in Y2K changeover, taking many SHARES Coordination Net check ins, including AAC2KYA (KY National Guard), WGY 955 (Illinois EOC), Red Fox 81 (Civil Air Patrol, IL), at 1418. AFA3HY-SHARES Coordination Station, Central, taking SHARES check in from WPKJ542, Pacific Bell, CA, at 1737. (Perron-MD)
- 14455.0 KHA 910-NASA, Edwards AFB, CA, working KHA 915, 920 (Jet Propulsion Laboratories, CA), and 925 (Houston Space Center, TX) in Y2K net at 2101. (Hugh Stegman-CA)
- 14807.0 FAPSI, Russia, with messages to WQL on RTTY link 80061, at 0900. (Boender-Netherlands)
- 14908.0 WGY 9161-FEMA mobile, working WGY 9501 on F-46, at 1527. (Bunyan-MO)
- 14980.0 FAPSI, Russia, brief RTTY tape at 1310. (Boender-Netherlands)
- 16201.0 WGY 910-FEMA, WA, with ALE tones and then voice call at 1634. (Bunyan-MO)
- 16315.0 Polemb Kinshasa-Polish Embassy, Congo, rogering eight ARQ messages from Warsaw, at 1535. (Hall-RSA)
- 17248.0 Cyprus Radio, with voice mirror ID at 1458. (Sevart-KS)
- 17940.0 Giant 397-Unknown aircraft over Montana, given 13348 secondary frequency by Cedar Rapids LDOC, at 1812. (Perron-MD)
- 17994.0 Canforce 4202-Canadian Forces, getting Keflavik weather from Trenton Military, at 0246. (Perron-MD)
- 18332.0 FAPSI, Russia, with 5-letter RTTY groups on link 10042, at 0631. (Hall-RSA) FAPSI, Russia, with CW messages to RPR on link 10042, at 0745. (Boender-Netherlands)
- 18387.0 Mangrove-US military, several hours in large net, clear and secure, with Pine Rose, Pawn Shop, Narration, Gas Mask, Road Show, Log Roll, and Reiterate, also using 11244, 18006, and 20407 kHz, all starting at 1551. (Haverlah-TX)
- 19325.0 The Counting Station-US CIA, callup and "numbers" in reduced-carrier USB. (Sevart-KS)
- 19359.9 FAPSI, Russia, with RTTY 5-letter groups on link 80038, at 0650. (Hall-RSA)
- 20153.0 DKAR-French Embassy, Dakar, Senegal, with 5-letter ARQ code groups for French MFA, Paris, a circuit not heard much anymore, at 1130. (Hall-RSA)
- 20659.0 WUE7-US Army Corps of Engineers, ALE with WUG at 1512. (Bunyan-MO)
- 21919.0 WGY 908-FEMA, CO, testing a duplex 4-wire circuit with WGY 912, FEMA Special Facility, VA other side using 20361, at 1706. (Bunyan-MO)
- 21964.0 Houston Radio, no joy contacting a calling aircraft, at 1826. (Perron-MD)
- 22737.0 RETM-Madrid Naval, Spain, with weather for RETMS and other such routing addresses, at 1535. RETH-Possibly Madrid Naval, with weather to RETJCT, a vessel, at 1540. (Hall-RSA)
- 22863.0 P6Z-French MFA, Paris, other side of duplex ARQ with Dakar, Senegal, at 1131. (Hall-RSA)
- 27985.0 AFA2HO-US Air Force MARS, in a net with AFA3DK, AFA3GK, AFA4BR, AFA6BI, AFA6DJ, and AFA6SE, getting interference from English and Spanish speaking outlanders, at 1545. "31-Oscar-68" was educated about transmitting illegally on military frequencies, at which point the guy apologized and went away. Later the net went to 13895. (Bunyan-MO)

## Voice Frequency Telegraphy Systems

A number of readers emailed Digital Digest to request a column covering VFT systems. Ever keen to oblige, this month we'll take a look at VFT—its construction, common variations, who uses them and where to find what few of them are left on the HF bands. First, the theory...

### VFT Construction

VFT (an abbreviation of MCVFT—multiple channel voice frequency telegraphy) simply uses a modem to place more than one channel of information within the passband of a single sideband (SSB) transmitter. Since a typical SSB transmitter passes voice frequencies best between 300 Hz and 3300 Hz, most VFT systems arrange their channels to fit within this range—hence the name for this technique. See Figure 1 for an example of a common VFT carrying 7 channels of 75 baud radioteletype (RTTY) within a 3 kHz band.

VFTs come in many varieties; however, in all cases, the typical VFT arranges between 2 and 16 channels within the available 3 kHz bandwidth. When describing VFT channel arrangements, it's usual to quote tone frequencies as offsets from the "bottom" of the 3 kHz VFT bandwidth rather than absolute (carrier) frequencies.

Each channel within the VFT may be sending information independently of all the others, the channels may all be sending the same information at the same time, or each channel may be sending the same information but time-delayed from the others. As one can imagine, the latter two techniques can be used to combat interference very effectively and provide more reliable than one single channel. Apart from increasing the total amount of information sent, this is one of the chief reasons for employing VFT over HF radio.

Individual channels within the VFT may be any of the usual frequency shift keyed (FSK) systems including Baudot RTTY, ASCII, ARQ-E and FEC-A, but of course with narrow shifts of between 80 and 200 Hz, due to the need to accommodate many channels in the available 3 kHz total VFT bandwidth. Since tuning VFT signals can be a complex affair for the operator, many arrangements include a "pilot" tone (or tones) at a known frequency which, once locked onto, then automatically aligns the decoding modem on each channel.

Let's look at a few VFT examples still in use today:

### BR6028 or "Barrie" VFT

6028 Series "Barrie" VFTs use 7 channels of 45 to 100 baud Baudot or FSK each with 170 Hz shift; it remains in use by US, New Zealand and Canadian Military. Channels are shifted in time, with each channel delayed by a second. Any channel with heavy interference can be locked out causing the transmitter side to stop using that channel. BR6028 has an unmodulated pilot tone at +560 Hz, and seven channels with centers at +850, 1190, 1530, 1870, 2210, 2550, and 2890 Hz.

US listeners in particular will find a very strong example of a classic BR6028 (probably US Navy) using 75bd/170Hz shift encrypted FSK channels on the following nighttime frequencies: 4083, 5343, and 8019 kHz (USB). Figure 1 shows the audio spectrum of this signal.

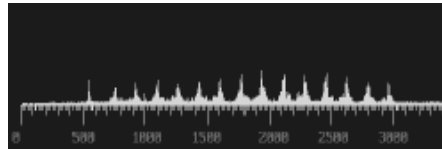


Figure 1: BR6028 VFT

### German Navy 3x150 bd VFT

The German Navy, primarily the Wilhelmshaven base (callsign DHJ59) and its warships have been monitored using a VFT configuration of 3 channels each running at either 150 or 200 bd with 150 Hz shift FSK (perhaps FEC) system with each channel spaced about 680 to 700 Hz. The designation of the 150 bd FSK signals is unknown. There is no pilot tone within this arrangement of the three channels, centered at +1190, 1870, and 2550 Hz.

DHJ59 and its VFT can be heard on many of the following frequencies:

2625.0 3056.0 3122.0 4154.5 6727.0  
 6730.0 6779.0 8335.5 10192.5 10197.0  
 10722.0 11256.0 12178.0 12415.5 15929.0  
 16129.0 17544.0 17994.0 22238.5 23744.0

### FEC-101 (FEC-A) VFTs

A variety of organizations make use of Siemens-developed 3-channel VFT arrangements of FEC-A (FEC-100) signals. These include the Israeli Military, German Air Force, and Indian and Serbian (ex-Yugoslavian) diplomatic services. Usual channel speeds are 96, 144 or 192 bd with shifts of between 80

and 170 Hz. The standard FEC-101 arrangement centers channels at +595, 1785 and 2635 Hz, which helps reduce mutual interference between the channels in the VFT. The following main "flavors" of this VFT are known...

A 3 channel 192bd/170Hz or 144bd/170Hz arrangement is used by the German Air Force and has channels centered at +680, 1280, and 1900 Hz. Traffic is always encrypted; the distinctive German system leads in with the character string %%%9+.&1#&@180)?7\$+:0(#3+7676 and ends in %%% %%% %%% %%% %%%. This VFT can be heard on 4037, 5743, 6962, 9276, 10571, and 15968 kHz.

The Indian MFA in New Delhi (callsign 8WD) has been using a 3 channel VFT with 96bd/170Hz shift and channels spaced 650 Hz. This VFT often appears on 16413 kHz.

### UK Naval Fleet Broadcast VFT

This common VFT arrangement features three, sometimes four irregularly spaced channels as follows:

**Ch 1:** +600 Hz offset, 100bd/200Hz shift encrypted RTTY

**Ch 2:** +1105 Hz offset, 75bd/75Hz shift encrypted RTTY

**Ch 3:** +1785 Hz offset, 75bd/340Hz shift Baudot CARB (Channel Availability information)

Other channels are also known to be present in this configuration, and can be heard on the following frequencies: 4320.3, 6360.3, 8640.3, 12919.3, and 17053.3 kHz. The latter two frequencies identify (on channel 3) with callsign MGJ, which is the Royal Navy's nuclear submarine base at Faslane, Scotland.

We'll finish up with a few more examples of VFT signals and the equipment you need to decode them next month.

### Correction

*The correct address for the SailMail Association that appeared in the February DD is [www.sailmail.com](http://www.sailmail.com), and not .org as we reported.*

### Utility Monitoring Central

UMC continues to grow. The majority of the HF section is now complete with profiles of hundreds of utility organizations on-line at [www.mindspring.com/~mike.chace/umc.html](http://www.mindspring.com/~mike.chace/umc.html) Comments, corrections, suggestions or further information are welcome.



## Latin America Music Styles Web Page

Henrik Klemetz and Jay Novello are pleased to announce the Latin American Music Styles web page, located at <http://havana.iwsp.com/radio/lamusic/>

"Spanish music," "Latin rhythms," are standard labels used by DXers to describe the kind of music they hear from Latin American broadcasting stations. Replace "Spanish" and "Latin" with, say, "American" and "Anglo," and perhaps DXers will better understand the vagueness of such terms.

It is not an easy task to determine the home of a musical variety if you have to choose from more than 20 countries. Even a native Latin American senses the difficulty, except of course when he has to identify the kind of music which is unique to his home country.

To assist in the identification of different Latin music styles, we present 90 samples for your listening enjoyment. Some of the styles represented are tropical, vallenato, cumbia, huayño, huaylas, chicha, pasillo, charanga, danzón, mambo, samba and forro, as well as the possibly less familiar joropo, bambuco, pasaje, bailecito, carrilera, zamba, chamamé and milonga. (Jay Novello, *DX Listening Digest*)

### Chinese for DXers

If you're interested in learning more Chinese as it relates to DXing, I suggest you consult Hans van den Boogert's excellent primer on this subject at: <http://www.swl.net/radiochina/chinese/fun.html> (George Maroti, hard-core-dx)

**ALBANIA** R. Tirana's English at 0130 runs from 12 to 14 minutes; the 0330, 23 to 26 minutes, both on 6115 and 7160. BBC 6110 spars with 6115. Sometimes 7155 R. Liberty challenges 7160. 40m ham traffic can be heavy! At 0330 there is also co-channel on 7160 (Bob Thomas, CT)

**BOLIVIA** R. Mallku, Uyuni, 4796.44, fair at 1003-1008. After playing a nice Bolivian huayno, the canned ID was: "*Desde el salar de Uyuni y para todo el sudeste potosino, transmite Radio Mallku en la frecuencia de 4795 kc banda tropical de 60 metros onda corta.*" The station which formerly IDed as Radio A.N.D.E.S. under the slogan "*la voz de los trabajadores campesinos*," was established and operated by FRUTCAS "Federación Regional Única de Trabajadores Campesinos del Altiplano Sud" (the Unique Regional Federation of Peasants in the Southern Highlands) which has members in five provinces in the Department of Potosí. The initials making up the station name stand for the first letter of the five provinces: Antonio Quijarro, Nor Lipez, Daniel Campos, Enrique Valdivieso and Sud Lipez.

According to the *Diccionario Quechua-Español* (published by the Municipality of Cusco, in 1995), "Mallku" has two meanings: the Inca Divinity invoked by the Andean diviners; Varayoc del Ayllu (the authority of the social organization in the Andes) nominated each year. It was symbolized by a totem of condor (*kuntur*), in the Inca civilization. According to the *Gramática y Diccionario Aimará* 2nd edition (published by Juan Enrique Ebbing; printed by Editorial "Don Bosco" in La Paz, Bolivia, in 1981), it is written as "Mallko" in Aymara and has two meanings: chief and condor. Consequently, Radio Mallku may be translated as "Radio Chief" which signified the peasants' federation's chief being invoked by diviner, or "Radio Condor" which signified the authority of the peasants federation, symbolized by the condor (Takayuki Inoue Nozaki, Japan, *Relámpago DX*)

I have not even tried to hear R. Mallku, 4796.5, but have obtained a verbal verité. Station accountant Doris González was quite capable of phonetically distinguishing between "maico" and "mallku" when I talked to her on the phone. Of course, it is Mallku, she said. Maico, no! Who said so? R. Andes is gone, and R Mallku obtained its license about one sesquimonth before. I pronounced "Andes" in one word, and so did Doris. Not "A.N.D.E.S" which would mean that you spell out each letter. I happened to become one of their first listeners outside of Bolivia. For more on that story, please refer to <http://www.algonet.se/~ahk/Dline96.htm> and look up the 4777v listing (Henrik Klemetz, Sweden, *hard-core-dx*) 4802v, R. Mamoré, Guayaramerín, 0034 ID as CP147 on 4815. New on 4766.4, R. Constelación, Guanay, sporadic testing

until 2130\* on same frequency as R. Guanay used. Later on 4766.5 at 1050 ID giving street address and phone, completely different from what an employee gave me (Rogildo Fontenelle A., Cochabamba, *DX Listening Digest*)

**BRAZIL** About Rádio RGS here in Porto Alegre, an official of the station told me: frequencies are 6160, 9550 and 11895 kHz. Programming is the same as Sistema Mundial LBV, from Rio de Janeiro. Some programs are produced here in Porto Alegre, as well as futebol games of the Gremio and Internacional teams. Station is at Avenida São Paulo No. 722, Bairro São Geraldo, Porto Alegre, Rio Grande do Sul, Brasil. Postal code: 90.230-160. Phone: (51) 337.6416. Station director: Paulo César Rodrigues. Manager's E-mail is [pauloru@zaz.com.br](mailto:pauloru@zaz.com.br) and E-mail of the station is [rgs1300@zaz.com.br](mailto:rgs1300@zaz.com.br)



Sistema LBV is a radio network which presents the lectures and preaching of journalist José de Paiva Netto, who is the worldwide director of the organization. LBV stands for Legião da Boa Vontade (Good Will Legion). It is some kind of religious sect which preaches goodwill and help for the needy as a way of life. Their site, English available, is: <http://www.lbv.org> info@lbv.org (Célio Romais, Porto Alegre)

**CHILE** Voz Cristiana blaster on 21550 accompanied by distorted FM spurs, no carriers, about 10 kHz wide centered around 21519 and 21581, i.e. plus and minus 31 kHz from the fundamental, when measured at 0050, a few minutes before signoff. An hour earlier, they were even worse (gh)

**COSTA RICA** A new quarterly RFPI program schedule goes into effect March 1; check for it at <http://www.rfpi.org> or request it direct from [info@rfpi.org](mailto:info@rfpi.org) (gh)

**CUBA** RHC's 11760 transmitter sometimes is clean, sometimes has a loud buzz out past 11750 and 11770, around 1215 checks (gh, OK)

**CZECH REPUBLIC/POLAND** Radio Prague wants to resurrect its Russian service, says station director Miroslav Krupicka. He has also revealed plans for a joint venture with Radio Polonia.

In a new year's eve interview on Prague's English service, Krupicka said: "I think the time is coming when we should consider reintroducing Russian because, like it or not, we are close to Russia, they influence our

*All times UTC; All frequencies kHz; \* before hr = sign on, \* after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-99=winter season, Oct-Mar; [non] = Broadcast to or for the listed country, but not necessarily originating there.*

lives, they are our trade partners." However, he added that, despite having received support for the project from the Czech parliament and the Foreign Ministry, it was not clear yet whether the government would provide the money.

Turning to the new joint venture with Radio Polonia, Krupicka said a new feature, *Europe East*, would be produced from the end of January by the English sections of the two stations. The new program would concentrate on news from all over central and Eastern Europe (Roger Tidy, England, *DX Listening Digest*)

**DENMARK** R. Denmark still refuses to put any English during the 12 daily hours it is relayed from Norway, but now there is an alternative (gh) You can now hear the News in English from DR Radio Monday to Friday in Real Audio, at 0740, 1000, 1610 and 2100 UT. More info and the RA link: <http://www.dr.dk/news/> Here you can also find out about DR News International's broadcasts in Arabic, Somali, South Slavic, Turkish, Urdu and Arabic – all on 1062 kHz + Real Audio (Erik Koie, DR Radio, *DX Listening Digest*)



**ECUADOR** HCJB has a Portuguese mailbag/DX program, *DX HCJB Internacional* Sats 0830 on 9745, 1630 on 15295, 2330 on 11920 (Santa Rita DX Clube via radio-escutas)

**EGYPT** For several days around Xmas, R. Cairo's English to NAM at 2300 on 9900 was in Portuguese instead; presumably mixed up feed with 15420 to LAM (gh)

**ETHIOPIA** Radio Fana schedule on 6210, 6940 kHz, MW 1080 kHz: Weekdays: Amharic 0330-0430, 0900-1000, 1500-1700 UT; Oromiffa 0430-0530, 1000-1100, 1800-2000. Weekends: Oromiffa 0330-0530, 1200-1500; Amharic 0530-0730, 1500-1800 (Clearly legible jpg via Andy Schmid)

[non] The new clandestine station – reportedly via a Deutsche Telekom transmitter and said to have started on 22nd December – calls itself "Voice of the Democratic Path of Ethiopian Unity" ("*Finote Demokrasi Ye-Ethiopia Andinet Dimts*" in Amharic). Stated very general aims and political orientation of the station (in favor of unity, democracy, human rights, etc) but making no mention of a sponsoring organization or contact details. Schedule is Wed 1600-1700 on 11670, Sun 0800-0900 on 21550 (Chris Greenway, England, British DX Club)

**GUAM** Effective Mar 26, KTWV will discontinue the *Pacific DX Report*, as well as several other locally produced features.

*Electronic DX Press* material will continue to be used as a key news source until the program terminates. If you do not have an *EDXP* QSL for this program, you still have until the end of March! Thu 0800 15330 (first edition), repeated Fri 1030 9865, Mon 1545 15330, Tue 0900 15200 (Bob Padula, *EDXP*)

**INDONESIA** On Oct 13, the city of Ujung Pandang reverted by presidential decree to its original name of Makassar in accordance with the wishes of the residents of Makassar. Ujung was the name used since 1972. The RRI station on 4753 has also changed its name to RRI Makassar (Richard Lam, Singapore, *Cumbre DX*) After all these years of being anti-Makassar, it's about time we and the Indos don't have to try to say Ujung Pandang! What's next – Celebes replacing Sulawesi?

**IRAN** [non] Clandestine, site for R. Internationale on 7520 in Persian at 1730-1800 except Mon and Wed, was triangulated by Deutsche Welle direction-finding to 46°N 38, 30°E 58. That means midway between Grigoriopol Maiac, Moldova, and Nikolayiv Kopani, Ukraine, so most likely from Moldova (Wolfgang Büschel, Kai Ludwig, Germany)

**ISRAEL** In mid-Jan, Israel Radio changed one frequency for English at 2000-2030 to 6240 IHz, 250 kW, 187° (Moshe Oren, Bezeq) Also at 0500-0515 11605 changed to 7475 kHz. And 2000-2030 on 7510 kHz the fixed log periodic at 341° changed to a curtain antenna to try to improve the signal. The curtain is only supposed be used up to 7470 kHz, which is why it was not used previously (Alan F. Holder, Isle of Wight, *DX Listening Digest*)

Galei Zahal, 6898: A fellow at this station who would only identify himself as "Kiko" had this to say about his station – We came on the shortwaves after the [first] earthquake in Turkey, but I am not sure why we are still on. Nor have I heard of any plans to end the shortwaves as we have been getting reports from everywhere. The transmitter is in the centre of Tel Aviv, but I am not sure how much power we are running (via Hans Johnson (c) *Cumbre DX*)

**ITALY** NEXUS-IRRS has been testing in pure USB Sat and Sun 0200-0300 on 7120, free radio programs in English and German, 10 kW non-directional but reports wanted from NAM. Reports can be emailed to: [info@nexus.org](mailto:info@nexus.org) The Nexus homepage is: <http://www.nexus.org> (via John Norfolk, Larry Nebron)

**KASHMIR** [non] From Pakistan on 5101, "*Sadaey Huriat Jammu Kashmir*" which means Free Voice of Jammu Kashmir, is observed at 1300-1415,

fair to good signal. English news at 1400; s/on at 1300 with *Allah-hu-Akbar* theme (Victor Goonetilleke, Sri Lanka, UADX via *BC-DX*)

**KOREA NORTH** Pyongyang Foreign Service no longer has total blackouts. Instead they switch off one or two or occasionally three pairs of transmitters every now and then to reduce the load on the power grid. Two usually have a strong buzz, and a third (standby?) also seems to have this problem to a lesser degree. Except for 6070 all FS transmitters appear to be at the same site, making a total of 9 at this site plus the possible standby. 6070 (6100 at other times) appears to be one of the ex-Swiss units, staying exactly on frequency (Olle Alm, Sweden, *BC-DX*)

**MADAGASCAR** R. Madagasikara on new 3306 at 1800-1900\* after ID and NA //3287 and 5009; fair reception. Zimbabwe not heard lately on 3306 (Mahendra Vaghjee, Mauritius, *DX Listening Digest*)

**NETHERLANDS** Passing of Emile Van Dulken: I (Dick Speekman) recently got word via Jim Vastenhou that the former Head of the English Section and my boss between 1974-1979 at Radio Netherlands, died during October 99. He was 86.

Emile van Dulken (called "Van" by most of the English language announcers) was one of the very early RN employees. I seem to recall he started there in 1947, when RN was still called "Radio Re-emerging Netherlands" (*Radio Herrijzend Nederland*), as it had been initially distilled from the London-based and BBC-facilitated Radio Free Netherlands. (*Radio Vrij Nederland*).

This now leaves very few of the old guard still alive. Harry van Gelder (86) and Jim Vastenhou (70) are still around and I was very fortunate to see both of them again when in Holland in 1999. Another veteran who is still to be heard via RN today is Rob Greene, who applied for the same *DX Jukebox* as I did in 1974. Harry van Gelder could not decide between us and hired us both, Rob Greene however, initially becoming a translator. You can also read his weekly "Insight" column on the RN web page. As for the Spanish programs, Alfonso Montealegre, erstwhile of *Espacio DXista* and later of *Radio Enlace* is also a veteran still working there (Dick W. Speekman, Australia, *Electronic DX Press*)

**NEW ZEALAND** RNZI new schedule expected March 20, but in Jan changed 17675 to 17690 part of the time to avoid interference from Radiostantsiya Tikhyy Okean:

<b>Mon-Fri</b>	1650-0605	17675
<b>Daily</b>	0606-1005	17690
<b>Sat-Sun</b>	1850-0605	17675
<b>Occasional Use:</b>	1105-1505	6105, 1505-1650 6145

The change of Government may be good for RNZI. The new Government were responsible 10 years ago when last in office for setting up RNZI. The change of Government improves RNZI's chances of having it funding restored to the previous level. They may also be more sympathetic to our current application for the purchase of a new transmitter which will deliver a digital audio signal. (Adrian Sainsbury, RNZI)

**NAMIBIA** NBC, 3290 // 3270 around 0300 mentioned NPR's *All Things Considered*! (Don Moore, PA) That would be from World Radio Network, now carried overnight by NBC; you may hear lots of international broadcasters on NBC frequencies (gh)

**PERU** 5857.4V, Radio Nueva Cajamarca, drifted slightly between 5757.3 and 5858.7 in the 1120-1142 period with rustic folklore, ads (Takayuki Inoue Nozaki, Japan, *Relámpago DX*)

5197.1, R. Sonora, Lima, at 2115-2155 with tropical music, many IDs for Sonora on 1110 kHz; I don't know what happened, but this had been R. Comas (Pedro F. Arrunátegui, Lima)

**PORTUGAL** [non] RDP Internacional dropped 24h broadcasts direct to East Timor, maintained Tetum via Taiwan 11550 at 1000-1100, 2200-2300 and added 0400-0600 (Koji Yamada, Japan, *Electronic DX Press*)

**SAIPAN** Mr. Grimm, Thank you for your interest in obtaining a QSL card from KFBS Saipan. Just send your report to [kfbprog@febc.org](mailto:kfbprog@febc.org), and we will be glad to verify your reception of KFBS. (David Creel, Acting Director FEBC, Saipan via Rudolf Grimm, radio-escutas)

**SEYCHELLES** Voice of Forgiveness, another Christian station in Arabic, 0345-0430 on 15530 and 1100-1300 on 15535. On the last frequency they have a programme in specialized English at 1245 on Saturdays only. I noted this station after 1300 too. VoF announce address in Beirut, Lebanon. Fax in Lebanon: 00961453021; e-mail: [webmaster@arabicradio.org](mailto:webmaster@arabicradio.org); <http://www.arabicradio.org> (Robert Petraitis, Lithuania, World DX Club via Barraclough) This is actually FEBA, exactly matching Arabic daily scheduling in BBCM, which gives English: 0815-0900 Fri on 15460, 1500-1600 daily on 11600, 1630-1700 Sun on 11605 (BBC Monitoring)

**SLOVAKIA** RSI in English at 0100 was suddenly blocked by Mideast station on 7300 (Dean Bonnanno, CT, *DX Listening Digest*) That would be Turkey in Turkish to NAM, long scheduled here (gh) But Turkey had not been using it until early January due to transmitter problems (Wolfgang Büschel, Germany, *BC-DX*) Then I heard Jake Slegers interviewing fellow RSI English broadcaster Pete Miller. Miller stated he was leaving RSI because

of problems with management. Slegers said listeners could expect many changes in the near future and indeed he would also be leaving shortly. I always felt RSI was the most folksy, friendly station. Any change from that is not for the better (Bonnano, *op. cit.*)

**SOMALIA** Radio Gaalkacyo is a local station in the Puntland region of Somalia. It announces that it broadcasts on the 31 and 41 metre bands, although has so far only been confirmed by BBC Monitoring on 41 metres (7012 kHz). It carries a current affairs programme called "*Xog-ogaal*" (Inside Information) devoted to social, political and economic issues in Puntland, as well as items on health, environment, culture and religion. ID: "*Halkani waa rediyo Gaalkacyo, Idaacadda Dowlad Goboleedka Puntland.*" 1600-1700 Daily in Somali on 7012v (©BBC Monitoring) During Ramadan, signed on an hour earlier at 1500 (Mahendra Vaghjee, Mauritius, *DX Listening Digest*)

Sam Voron, who helped set up this transmitter, refers to it as Radio Free Somalia, and says: The 31 mb frequency is via a small 5 watt relay in Bossasso. They used to operate on 9415 or 9420, but not sure of current frequency (Hans Johnson, *Cumbre DX*)

Somali orthography and pronunciation is a subject by turns fascinating, bewildering and frustrating. Until the the 1960s the Somali language was generally written using the Arabic alphabet, but then President Siad Barre (pronounced See-add Ba-ray) decided that Somalia needed such modern delights as one-party rule, Marxism-Leninism and the Roman alphabet.

However, the introduction of the Roman alphabet was done in a delightfully eccentric manner. For example, the letter X was deemed to be pronounced like H, so many Somalis have the first name Moxamed. Similarly, it was deemed that the letter C should be a vowel! It is pronounced something like a short, sharp A. Thus there is a town in northern Somalia which is spelt Burco, but pronounced Bur'ow. Another great one to catch the unwary is a town in southern Somalia spelt Baydhabo but pronounced Buy-doh-a. Thus Gaalkacyo is pronounced Gaaal-ky-oh, not Gal-kak-yoh as one might think (Chris Greenway, BBC Monitoring, *Review Of International Broadcasting*)

**SRI LANKA** The relay station at Ekala, near Colombo, had been transmitting VOA programs since 1953. It closed down Dec 31, 1999, being replaced by the new relay at Iranawila, already in limited service (Kim Elliott, VOA *Communications World* via John Norfolk)

**SUDAN** [non] RN carried a prototype special broadcast New Year's Day from NCRV in Holland, Voice of Salaam, Voice of Hope in the Arabic of Southern Sudan, via Madagascar. Plans regular broadcasts later this year once windup radios have been distributed. Was at 0430-0530 on 15320, 12070 (RN *Media Network*) Intention is to start a weekly transmission in May. Programming is to be produced in the region, and they are not ready yet set up to start regular transmissions. There will be more about this project in *Media Network* as things develop (Andy Sennitt, *Cumbre DX*)

**SWEDEN** Storms with hurricane-force winds in December caused some damage at R. Sweden's Hörby transmitter site, the worst being a destroyed log-periodic antenna (Magnus Nilsson, Teracom, SCDX *MediaScan*)

**TANZANIA** Reactivated R. Tanzania, Dar es Salaam on 5985, fair-good with QRM from China, 1400 In Swahili on Islam, 1430 ID; 7165 not heard (Mahendra Vaghjee, Mauritius, *DX LISTENING DIGEST*) [Congo, Brazzaville also on 5985 at 2100 (Don Moman, Alberta)]

**THAILAND** R. Thailand at 1000-1100 on 11805 in Thai seems to be a program for troops in Timor (Noel Green, UKOGBANI, *BC-DX*)

**TIBET** [non] V. of Tibet, clandestine via Central Asian sites daily: 2315-2400 and 0100-0145 9920; 1215-1300 9910, 15650 (BBC Monitoring)

**UNITED ARAB EMIRATES** Do not expect any news about Dubai, especially if it is negative, on UAE Radio's diminished English newscasts. Dec 29 at 1330 on 13675 the three minutes contained only a few international stories before going to a Ramadan feature at 1334. Just a few minutes later on *Newshour*, BBC spent as much time on one story from their correspondent in Dubai, about merchants falsifying invoices to avoid paying tax on imported luxury items (gh)

Voice of the UAE, Abu Dhabi, on late and propagating for Ramadan on 17760, had timesignals 25 seconds late both at 2300 and 2400. Standard remark about inaccurate timesignals (gh)

**UK o GBANI** BBCWS head Mark Byford appeared on *Write On*. Revealed that next major program shuffle in April will bring the introduction of EIGHT instead of just 3 regional streams in an effort to satisfy more listeners. News will remain the core, especially at breakfast, noon and tea-time, but he maintains there will be no reduction in the amount of feature programming (gh)

**USA** News Now changes on VOA as of Feb 5 affect *Communications World*:

One segment of 25 minutes only at the following Saturday times: 0132, 0532, 0932, 1332, 1732, 2132.

Also, English to Africa is being reduced to these segments: M-F 0300-0630, 1600-1900, 1930-2230; Sat 0300-0700, 1600-2130; Sun 0300-0700, 1600-2200. And VOA has a new zip code: 20237 (Kim Elliott, VOA CW)

William Winter, veteran radio and television commentator and the first "Voice of America" has died at the age of 92. In 1956, Winter became the only American to receive the Philippines' designation as Commander of the Legion of Honour for his work during World War II. A special military parade was staged in Manila.

The voice of William Winter is part of Philippine history. Without his daily reassurance heard on secret radios, Philippine resistance would not have been possible. In addition to the Philippines, several other governments, including Australia, honoured Winter for his wartime broadcasts.

It was when the director of the Malaya Broadcasting Corp. asked to relay Winter's commentaries throughout Asia via shortwave, that the United States decided, only months before the bombing of Pearl Harbour, to make Winter its first State Department sponsored "Voice of America." During the final two years of the war, when Winter accompanied MacArthur, the broadcaster became so reviled by Japan's Radio Tokyo that it aired a play featuring three men barred from heaven because of their wickedness - Franklin D. Roosevelt, Winston Churchill and Winter. (*Q-News* via Robin L. Harwood, *swprograms*)

The first airing of our *World Of Radio* on WBCQ 7415 has shifted to Wed 2230; DST changes to 2130 from April. The first airing on WWCR, Thu 2130, shifts in March from 9475 to 15685; all WWCR times change one UT hour earlier from April for DST. For latest *WOR* schedule see <http://www.angelfire.com/ok/worldofradio>

We have received numerous complaints from listeners that no QSLs have been forthcoming from WGTG. Dave Frantz now explains his policy: 1) Listeners must provide 5 hours of programming details; they do not have to be consecutive, but can be any combo of hours or days. 2) SAE. 3) Postage or 2 IRCs.

We will be adding another transmitter for total of five; three new antennas for total of 7; started construction on 7000 sq ft transmitter building. Upgrading all transmitters to 120 kW. We will be more powerful than WWCR, WHRI, etc. with much better antennas, directions (Dave Frantz, WGTG, *DX Listening Digest*)

WGTG shifted 12170 USB to 12172 at the request of an Army Materiel Command emergency communications net on 12168, Dave Frantz announced (Johnathan Grant, *World Of Radio*)

Although WBCQ-2 on 9340 was expected to operate primarily on AM, after testing in Dec, Al Weiner said he has the best quality SSB anywhere on this transmitter (gh)

Splattery signal on about 26470 from WJFP in Florida, a non-commercial black-oriented station with several translators. It is quite powerful and seems more like sideband than narrow-band FM relays such as WFLA. It could be a real fooler, since on Sunday afternoons they have a program in Creole intended for a local audience (Max Swanson, MN)

WAMY, Amory, MS, listed and announcing 1580 kHz with clear ID at 1230, about 40 dB over the noise floor in East Texas on 2480 (Bill Smith). Aha, WWZQ, 1240, Aberdeen, MS, is a widely reported harmonic on 2480, including by me. The *M-Street Directory VIII* showed them both in the Tupelo market, no business relation between them, but I bet there is now! With WWZQ simulcasting WAMY. Congrats on adding a rare, actually otherwise impossible SWBC state, Mississippi, to your logbook, though you dislike harmonics (gh)

**VIETNAM** [non] Que Huong Radio via KWHR expanded to: Mon-Thu 1300-1359 on 9930; Mon-Sat 2300-2359 on 17510 (Ludo Maes, Transmitter Documentation Project)

**YEMEN** 9780, anthem to 1800, YL with intro to their 60 minute English language programs with FM, MW and SW freqs. ID "This is the English Service of the Republic of Yemen Radio broadcasting from San'a." Music bridge and into news items. Excellent signal (Don Moman, Alberta, *DX Listening Digest*)

**ZAMBIA** 6265, ZNBC with English news Dec 23 at 1808, main points repeated to 1810, into African chants and talk, mention of Zambia. Still good at 1900, and even better at 2000 with somber organ music, Radio Zambia ID, 2001 English ZNBC ID. Heard daily during the day and well into the evenings with consistently good signals. Some good/great conditions over the holidays. Very interesting stuff during the mid day times, with the short days. Beaming straight north [with the log periodic antenna] often produced the best signals at local noon, regardless of the actual heading of the station (Don Moman, Alberta, *DX Listening Digest*)  
*Until the Next, Best of DX and 73 de Glenn!*



# Broadcast Logs



Gayle Van Horn

## 0000 UTC on 7545

ISRAEL: Kol Israel. Time pips to station identification, national news to in-depth item on Arafat. (William McGuire, Cheverly, MD)

## 0005 UTC on 4980

CHINA: Xinjiang PBS. Mongolian service with beautiful regional Mongolian folk music to male presenter's text. Fairly loud signal. **China Radio Int'l** 2334-2342, 4815 Russian service with Mandarin language lessons. **CNR Beijing** 2203-2215, 7935 Mandarin service, fair signal, **Heilongjiang PBS** (tentative) 2315-2225, 7350 Mandarin service very weak with deep fades, fluttery during signal peaks. **Bayan Hot PBS** 2230-2240, 6025 Mandarin with excerpts from recorded speech segment, Radio Ukraine interference. (Thomas Roth, Germany/*Hard Core DX*)

## 0053 UTC on 6535.7

PERU: Radiodifusoras Huancabamba. Nonstop flute music to 0100 Spanish text and musical bridges. Clear ID at 0104. Peru's **Radio Super Nueva Sensacion** 2324-2353 with religious text format. ID 2349, fair signal quality. **Radio Sudamerica** 0042-0053, 5523. (Mark Veldhuis, Borne, Netherlands/*HCDX*)

## 0232 UTC on 9835

HUNGARY: Radio Budapest. Station interval to ID and national newscast. (McGuire, MD)

## 0317 UTC on 3346

BELARUS: Radio Mayak. Presumed Belarussian service with popular music interspersed by male/female talk. Two segments of interval signal at 0329, followed by newscast. Signal poor, hampered by intermittent Morse code traffic. (Mark J. Fine, Remington, VA)

## 0752 UTC on 9530

RUSSIA: Magadan Radio. Russian program segment to speech portion, time pips and Radio Rossii ID 0800, // 9600 good, 7320 fair. Noted signal under Radio Japan after 0800. (David Yocis, New York, NY/*HCDX*)

## 0820 UTC on 9615

USA: KNLS-Alaska. Nice signal for English service. Oldies tunes from Roy Orbison and two IDs. *World Report* program on Y2K issues. (Yocis, NY/*HCDX*)

## 0832 UTC on 9835

JAPAN: Radio Japan. Program segments, // 9530, 9685 very good signal in New York. (Yocis, NY) 0500 on 6110 national news. (McGuire, MD)

## 0836 UTC on 9570

SOUTH KOREA: Radio Korea Int'l. English travelogue to southwestern Korean peninsula city, good signal but fluttery. (Yocis, NY/*HCDX*)

## 0855 UTC on 9975

NORTH KOREA: Radio Pyongyang. Martial music to "dead air" on carrier to interval signal 0900. Two Russian identifications as, "Govorit Pyongyang," very good signal. North Korea's **KCBS** 9666.3, 0900 with martial music, // 11680. (Yocis, NY/*HCDX*) **Radio Pyongyang** audible 1500-1520, 11710 with English news with poor modulation. (Charles P. Crawford, KY, USA/*HCDX*)

## 1134 UTC on 7294.99

MALAYSIA: RTM Radio 4, Kuala Lumpur. Pop music interspersed with disk jockey's chatter and intros for *Little Willy*, *Cuts Like a Knife* and *Buffalo Soldiers*. Fair signal with flutter, occasional interference from amateur radio operators on USB. (Fine, VA)

## 1205 UTC on 21810

SWEDEN: Radio Sweden. *Media Scan* featured international broadcasting // 18960. (Bob Fraser, Cohasset, MA) 0345, 9495 *Report on Stockholm 2000*. (McGuire, MD)

## 1231 UTC on 5019.97

SOLOMON ISLANDS: SIBC. English service to regional music to 1235. Phone-in calls with fairly audible signal, but carrier floating around a bit. (Fine, VA)

## 1234 UTC on 7184

BANGLADESH: Radio Bangladesh. English news to 1236, followed by male's commentary. Local music introduced by woman 1240. Station ID 1245, "you are listening to the external service of Bangladesh Betar," to financial report segment. ID repeat 1249. Very good signal with slow deep fades. (Fine, VA)

## 1430 UTC on 5985

MYANMAR: Radio Myanmar (tentative). Asian music to program announcement and western pop tunes. News style format 1448-1452 into regional music. Poor to fair signal quality. (Antonello Napolitano, Taranto, Italy/*HCDX*)

## 1541 UTC on 4850

INDIA: All India Radio. English news to headline repeats to "that is all for tonight" to piece of Indian music. "All India Radio" identification to program preview. Good signal with interference from presumed Uzbekistan. (Veldhuis, NLD/*HCDX*) **AIR-Juipur** 1546-1550, 4910 Hindu service to local ID. (Antonello Napolitano, Taranto, Italy/*HCDX*) **AIR-Calcutta** 1750-1820, 4820 tentative for Bengali service. (Roth, Germany/*HCDX*) **AIR-Bangalore** 1803-1809, 15200 English newscast to ID, // Bangalore frequencies 11620, 7410 strong, **AIR-Delhi** 9950 and **AIR-Aligarh** fair to good. (Veldhuis, NLD/*HCDX*) **AIR-Port Blair** (Andaman Islands) 2350-0002, 4760. (Daniele Canonica, Muggio, Switzerland) AIR website: <<http://air.kode.net/>>

## 1559 UTC on 8000.8

SUDAN: Voice of Sudan. Sign on with march music and mentions of Sudan in Arabic and frequency quote. Regional music at 1620, fair to good signal quality. (Napolitano, Italy/*HCDX*)

## 1740 UTC on 15190

PHILIPPINES: Radio Pilipinas. Presumed Tagalog with bits of English segments from male/female duo. Signal was fair with usual flutter, // 11730 weaker popped in after 1817. Station ID at 1824. (Fine, VA) 1755 on 11730 // 15190 with frequent IDs. (Woman, CAN/*HCDX*)

## 1846 UTC on 17674.97

NEW ZEALAND: Radio New Zealand Int'l. Rare mid-morning reception of RNZL in English for these parts. Music tunes with good signal and very intelligible. (Fine, VA; Moman, CAN/*HCDX*)

## 1905 UTC on 5026

UGANDA: Radio Uganda. English news from male announcer // 4976. Low modulation for fair quality signal. SIO 343. (Napolitano, Italy/*HCDX*)

## 1925 UTC on 15476

ANTARTICA: Radio Nacional Arcangel S. Gabriel. Spanish music to clear station ID, 1934\*. (Napolitano, Italy/*HCDX*)

## 2003 UTC on 2310

AUSTRALIA: VL8A Alice Springs. Male announcer's English newscast to weather update and pop music. Birthday greetings to "ABC" IDs and jingles. VL8T Tennant Creek 2030 on 2325 with ABC IDs and report from Macau. (Veldhuis, NLD/*HCDX*)

## 2015 UTC on 9895

BONAIRE: Radio Netherlands. Report on plight of orphan children in Zimbabwe, // 13700, 17605. (Fraser, MA; Banks, TX)

## 2036 UTC on 15435

LIBYA: Voice of Africa. English news to 2038, followed by short music segment and Arabic text. Good signal with muddy audio. (Fine, VA)

## 2054 UTC on 15580

UNITED STATES: Voice of America. *Africa World Tonight* segment focusing on immunizing children, // 15240. (Dan Smith N2PTF, Cazenovia, NY) VOA 7200, 0100 with ID and world news. (McGuire, MD) Website <[www.voa.gov](http://www.voa.gov)>

## 2100 UTC 15410

ANTIGUA: Deutsche Welle. Station ID to news and discussion on the Panama canal. *Newslink* program at 2105. (Smith, NY) 0320 on 9640 report on foreign prisoners. (McGuire, MD)

## 2245 UTC on 6190

PHILIPPINES: Radio Veritas. Mandarin text to slow pops, "this is Radio Veritas broadcasting from the capital city." Indonesian service 2255 with fair signal. (Roth, Germany/*HCDX*)

## 2332 UTC on 9504.6

PERU: Radio Tacna. (tentative) Weak signal for fast paced sports commentary. Weak signal noted and interference from Brazilian station (Radio Record?) on 9505. (Veldhuis, NLD/*HCDX*)

Thanks to our contributors — Have you sent in YOUR logs?  
Send to **Gayle Van Horn**, c/o Monitoring Times (or e-mail [gayle@webworkz.com](mailto:gayle@webworkz.com))  
English broadcast unless otherwise noted.

## Ethiopia - Radio from the Horn of Africa

Originally broadcasting as the Voice of Revolutionary Ethiopia, it changed its name to the Voice of Ethiopia and eventually to Radio Ethiopia.

Radio Ethiopia's domestic National Service is broadcast Monday through Friday, in English 1030-1100 UTC on 5990, 7110 and 9705 kHz. Address your report to P.O. Box 1020, Addis Ababa, Ethiopia. The External Service broadcasts daily 1600-1700 on 7165, 9560 and 11800 kHz. Reports to: Audience Relations & Program Exchange Service, Radio Ethiopia, P.O. Box 654, Addis Ababa, Ethiopia. Return mint postage or one IRC should be enclosed.

Radio Ethiopia's official website <<http://www.angelfire.com/biz/radioethiopia/>> contains their national anthem via Real Audio and additional station information, language services, maps, embassy and email links.

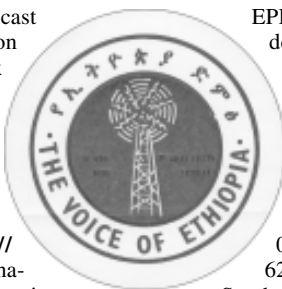
Ethiopia's Radio Fana (an Amharic word for "torch" or "light"), is a domestic broadcaster which began broadcasting on November 7,

1994, at which time it was operated by the Ethiopian People's Revolutionary Front (EPRDF, the ruling coalition).

According to the station, it is no longer owned by EPRDF but is now reportedly, "an autonomous radio station deriving its income from educational sponsorship by non-governmental organizations." News is supplied by the Walta Information Centre. Address your English report to P.O. Box 30702, Addis Ababa, Ethiopia. Email correspondence is also available via [radiofana@telecom.net.et](mailto:radiofana@telecom.net.et)

Broadcasting in Amharic, Oromo, and Somali regional languages, the domestic service is audible daily 0330-0530 on 6210, 6940; Saturday/Sunday 0530-0800 on 6210, 6940; daily 0900-1100 on 6210, 6940; Saturday/Sunday 12-14400 on 6210, 6940; daily 6210, 6940; daily 1500-1800 on 6210, 6940; Monday-Friday 1800-2000 on 6210, 6940. Radio Fana also has reportedly broadcast on alternative frequency of 9335 kHz.

Radio Ethiopia: a great catch from the Horn of Africa!



### ETHIOPIA

Radio Ethiopia, 7110 kHz. Full data QSL card unsigned, plus note signed by Woinshet Woldeyes-Audience Relations & Program Exchange Service Secretary. Schedule, station decal and an Ethiopian Tourism Commission brochure. Received in 63 days for an English report, cassette tape of reception and one U.S. dollar. Station address: P.O. Box 654, Addis Ababa, Ethiopia. (Randy Stewart, Springfield, MO)

Radio Fana, 6210 kHz. Full data QSL card unsigned, received via registered mail in 27 days for an English report. Station address: P.O. Box 30702, Addis Ababa, Ethiopia. (Duane Hadley, Savannah, GA) Radio Fana 6210, QSL card signed by Mulugeta Gessese-General Manager. Received in two months for one U.S. dollar and souvenir postcard. (Richard Jary, Australia/Cumbre DX)

### ICELAND

Icelandic National Broadcasting-Ríkissutvarpid, 11402, 13860 kHz USB. Full data scenery card unsigned. Received in 45 days for an English report mint stamp and one U.S. dollar. Station address: International Relations Dept., Efstaleiti 1, IS-150 Reykjavik, Iceland. (Hadley, GA)

### LAOS

Laos National Radio, 6130 kHz. Full data letter signed by Ms. Malivarn-English Section. Received in 73 days via registered mail for an English report and two U.S. dollars. Station address: Laotian National Radio & TV, Boite Postal 310, Vientiane, Laos. (Tom Banks, Dallas, TX; Frank Hillton, Charleston, SC)

### MALAWI

Malawi Broadcasting Corp., 5993.50 kHz. Full data verification on station letterhead, with illegible signature. Received in 39 days for an English follow up report, prepared veri form letter (unreturned) one U.S. dollar, mint stamp and two souvenir postcards. Five beautiful Silvery Cheeked Hornbill bird stamps on letter cover. Current scheduled noted within letter as; daily 0257-0810, 3380; 0357-0810, 5995; 1515-2210, 3380 kHz. Station address: P.O. Box 30133, Chichiri, Blantyre 3, Malawi. (Gayle Van Horn,Brasstown, NC)

### MEDIUM WAVE

DYBB, 1503 kHz AM. Full data card signed by Ms. Carlota E. Degracia. Received in 64 days for an AM report, \$10 Philipino bill and two post cards. Station address: RGMA Network Inc., 2<sup>nd</sup> Floor, Arcenas Bldg., Roxas Ave., Roxas City, Philippines. (Patrick Martin, Seaside, OR)

KENI, 650 kHz AM. Full data verification letter signed by Van Craft-

Chief Engineer. Received in 305 days for an AM report. Station address: 800 East Diamond B1 #3-370, Anchorage, AK 99515. (Martin, OR)

KLIB, 1110 kHz AM. Hand written personal letter from Rosa Garnja-Sales Dept. Received in ten days for an AM report. Station address: 3463 Ramona Ave., Suite 15, Sacramento, CA 95826. (Martin, OR)

WWNC, 570 kHz AM. Full data prepared verification letter signed by Chief Engineer, plus station bumper sticker and decal. Received in 12 days for an English AM report, and mint stamp. Station address: P.O. Box 6447, Asheville, NC 28816. (Lloyd Van Horn, Brasstown, NC)

### MONGOLIA

Voice of Mongolia, 12085 kHz. Full data folk style color postcard unsigned, plus personal note and schedule. Received in 82 days for an English report and two IRCs. Station address: C.P.O. Box 365, Ulaanbaatar 13, Mongolia. (Brian Bagwell, St. Louis, MO)

### SOUTH KOREA

Radio Korea Int'l, 15575 kHz. Full data *Seoul World Cup Stadium* card unsigned, plus KBS newsletter and schedule. Received in 45 days for an English report. Station address: #18 Yoido-dong, Youngdungpo-gu, Seoul 150-790 Korea. (Stewart, MO)

### TIS/TRAVELERS INFORMATION STATION

Lake Tahoe, Ca., 1680 kHz. Email confirmation from Bob Hamilton-Sales Dept. Received in three hours for a utility report. Station operated by the North Star Ski Resort. Email address: <[bhamilton.ns@boothcreek.com](mailto:bhamilton.ns@boothcreek.com)>. (Martin, OR) Three hours ? I think that's a record Pat! -ed.

Mountain View, NASA/Ames Research Center, 1700 kHz. Email confirmation from John Peterson. Received in a few hours for a utility report. Email address: [jepeterson@mail.arc.nasa.gov](mailto:jepeterson@mail.arc.nasa.gov). (Martin, OR) MW QSL # 2599 !

### USA

Radio Taipei Int'l via Okeechobee, FL, 5950 kHz. Full data QSL card unsigned, plus post card, schedule and *The Free China Journal* newsletter. Received in 167 days for an English report. Station address: 55, Pei'an Rd., Tachih, Taipei 104, Taiwan. (Anthony Maslanka, Cleveland, OH)

WBCQ-The Planet, 7415 kHz. Full data color globe/logo card signed by Alan Weiner. Received in 25 days for an AM report, mint stamp and self addressed envelope (both used for reply). Station address: 97 High Street, Kennebuck, ME 04043. (Van Horn, NC)

# Self-Powered Radios!

## Don't Let Power Outages Isolate You!



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The ICF-B200 provides not only quality AM/FM reception in a tiny (6"x3"), lightweight (11 oz.) case, but also never needs batteries or sunlight to operate! That's right, a high efficiency, easy-hand-turned generator provides all the power needed for this radio—one minute's spin gives you a full 15 minutes of play time! And you can even install two AA alkaline batteries for many hours of unattended, extended operation! An LED status indicator alerts you to charge conditions.

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e-mail: [order@grove-ent.com](mailto:order@grove-ent.com)



## HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af  
 ① ② ⑤ ③ ④ ⑥ ⑦

### Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7, or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

### Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ① then alphabetically by country ③ followed by the station name ④ (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

#### Day Codes

s Sunday  
 m Monday  
 t Tuesday  
 w Wednesday  
 h Thursday  
 f Friday  
 a Saturday

In the same column ⑤ irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

### Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports

from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

#### Target Areas

af: Africa  
 al: alternate frequency (occasional use only)  
 am: The Americas  
 as: Asia  
 au: Australia  
 ca: Central America  
 do: domestic broadcast  
 eu: Europe  
 me: Middle East  
 na: North America  
 om: omnidirectional  
 pa: Pacific  
 sa: South America  
 va: various

### Consult the propagation charts.

To further help you find a strong signal, we've included a chart on page 64 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

### Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours – space does not permit 24-hour listings. Our program manager changes the stations and programming featured each month to reflect the variety available on shortwave, though BBC programs are almost always included.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The capital letter stands for a day of the week, using the same day codes as in the frequency listing (see above), and the four digits represent a time in UTC.

## MT MONITORING TEAM

Gayle Van Horn  
 Frequency Manager  
[gayle@webworkz.com](mailto:gayle@webworkz.com)

Jim Frimmel  
 Program Manager  
[frimmel@star-telegram.com](mailto:frimmel@star-telegram.com)

Jacques d'Avignon  
 Propagation Forecasts  
 Ontario, Canada  
[monitor@rac.ca](mailto:monitor@rac.ca)

Mark Fine, VA  
[fineware@erols.com](mailto:fineware@erols.com)

Dan Roberts, CA

## PROGRAM HIGHLIGHTS

### JIM FRIMMEL, PROGRAMMING MANAGER

**Media Network**, the Radio Netherlands weekly communications magazine program, celebrates big time on Thursday, March 2nd. Diana Janssen and Jonathan Marks will be broadcasting the 1000th edition of their highly-rated weekly program. All contributors, past and present, are being invited to look back on the past 20 years of electronic developments and the predictions that came true and those that did not.

A "Challenge for 2000" contest is planned and listeners will be invited to participate. You can get all the details from the RN website at [www.rnw.nl/en/](http://www.rnw.nl/en/). Best times and frequencies for NAm listeners is 0030 Thursday (UTC Friday) on 6165/9845 and 0430 Thursday (UTC Friday) on 6165/9590.

A visit to an international broadcaster's web site can sometimes reveal a world of information about the culture, geography, and history of the country. Students should be advised of this possible insight to a country or region under study. SWLs can better understand a country they are listening to.

A good example of this can be found at the Radio Slovakia Intl site [www.slovakradio.sk/rsi\\_pages/rsi\\_engl\\_main.html](http://www.slovakradio.sk/rsi_pages/rsi_engl_main.html). Once you arrive at this page, click on "Regions of Slovakia" to advance to another page containing a map of Slovakia's eight regions. Click on a coat of arms to go to a particular region where you will find a wealth of information about that region with accompanying photographs.

The photos are all in a sepia tone appearance, but when you click on one, a larger size full-color photo appears. There are no instructions about this and we were surprised to discover this wonderful source of over 100 photographs of Slovakia's beauty. Other useful information is for tourists with listings for tourist offices and accommodations.

Another example of hidden information can be found on Radio Prague's web site [www.radio.cz/english/](http://www.radio.cz/english/). In the section "About the Czech Republic" can be found details of Czech history, a photo tour of Prague, and other useful information. One interesting topic is about the history and origin of the Roma (gypsies). Another has to do with the history and culture of Czech beer and a list of Czech breweries.

## FREQUENCIES

0000-0100	Anguilla, Caribbean Beacon	6090am			
0000-0100 vl	Australia, ABC/Katherine	5025do			
0000-0100 vl	Australia, ABC/Tent Creek	4910do			
0000-0100	Australia, Radio	9660as	12080as	15240as	17580as
		17750as	17795as	21740as	
		9400na			
0000-0100	Bulgaria, Radio	7375na			
0000-0015	Cambodia, Natl Radio Of	11940as			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0059	Canada, Radio Canada Intl	5960na	9755na		
0000-0029 twfha	Canada, Radio Canada Intl	6040na	9535am	11865am	
0000-0100	Costa Rica, RF Peace Intl	6975va	15050va		
0000-0100	Ecuador, HCJB	9745na	12015na	21455na	
0000-0030	Egypt, Radio Cairo	9900am			
0000-0100 vl	Guatemala, Radio Cultural	3300do			
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as
		13625as			
0000-0015	Japan, Radio/NHK	6050eu	6155eu	9665af	11705na
		11815as	13650as		
0000-0100	Kiribati, Radio	9810do			
0000-0100	Liberia, LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100	Malaysia, RTM Sarawak	7160do			
0000-0100 vl	Malaysia, RTM KotaKinabalu	5980do			
0000-0030	Mexico, Radio Mexico Intl	9705am			
0000-0100	Namibia, NBC	3270af	3289af		
0000-0100	Netherlands, Radio	6165na	9845na		
0000-0100	New Zealand, R NZ Intl	17675va			
0000-0056	North Korea, R Pyongyang	4405va	11460na	11710na	13760na
		15180na			
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Philippines, FEBC R Intl	15175do			
0000-0100	Singapore, RCorp Singapore	6150do			
0000-0100	Spain, R Exterior Espana	6055na			
0000-0030	Thailand, Radio	9655af	9680va	11905af	
0000-0100	UK, BBC World Service	3915as	5965as	5975na	6175na
		6195as	7110as	9915eu	11945as
		11955as	12095sa	15280as	15360as
		17790as	15310as	15360as	17615as
0000-0100 a	UK, Merlin Network One	3985eu			
0000-0100	USA, Armed Forces Network	4278am			
0000-0100	USA, KAIJ Dallas TX	5835va			
0000-0100	USA, KJES Vado NM	7555na			
0000-0100	USA, KTVN Salt Lk City UT	7510na			
0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0030	USA, Voice of America	7215as	9890as	11760as	15185as
		15290as	17735as	17820as	
0000-0100 twfha	USA, Voice of America	5995am	6130ca	7405am	9455af
		9775am	11695ca	13740am	
0000-0100	USA, WBCQ Monticello ME	7415na			
0000-0100	USA, WEWN Birmingham AL	5825na	9355eu		
0000-0100	USA, WGTG McCaysville GA	5085va	6890am		
0000-0100	USA, WHRA Greenbush ME	7580na			
0000-0100	USA, WHRI Noblesville IN	5745na	7315na		
0000-0100	USA, WINB Red Lion PA	11950am			
0000-0100	USA, WJCR Upton KY	7490na	13595na		
0000-0100	USA, WRNO New Orleans LA	7355na			
0000-0100	USA, WSHB Cypress Crk SC	7535na	9430am	15285ca	
0000-0100	USA, WTJC Newport NC	9370na			
0000-0100 as	USA, WWBS Macon GA	11900na			
0000-0100	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0000-0100	USA, WYFR Okeechobee FL	6085na	9505na		
0000-0030 vl	Vanuatu, Radio	4960do			
0010-0020	Kyrgyzstan, Kyrgyz Radio	4010eu	4050eu		
0015-0045 as	Armenia, Trans World R	6240eu			
0015-0100	Japan, Radio/NHK	6050eu	6155eu	9665af	11705na
0015-0045 as	Monaco, Trans World Radio	6240as			
0030-0100	Iran, VOIRI	9022am	9795ca	11970na	
0030-0100	Lithuania, Radio Vilnius	6120na			
0030-0100 vl	Solomon Islands, SIBC	5020do			
0030-0100	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9730as
		15425as			
0030-0100	Thailand, Radio	9655as	11905as	13695na	
0030-0100	USA, VOA Special English	7215as	9890as	11760as	15185as
		15290as	17735pa	17820as	
0050-0100	Germany, Int'l BC Tamil	7150na	7460na		
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	
0050-0100 vl	UK, IBC Tamil	9460va			

## SELECTED PROGRAMS

## Sundays

- 0000 USA, KTVN Salt Lk City UT: The Coral Ridge Hour. Dr. James Kennedy preaches from the Coral Ridge Presbyterian Church of Fort Lauderdale, Florida.
- 0000 USA, WTJC Newport NC: The Bible in Living Sound.
- 0030 Iran, VOIRI: Opening Prayers.
- 0030 USA, WTJC Newport NC: Music.
- 0035 Iran, VOIRI: News.

## Mondays

- 0000 USA, KTVN Salt Lk City UT: Dr. Clarence MacClendon. See S 1300.
- 0000 USA, WTJC Newport NC: Music.
- 0030 Iran, VOIRI: Opening Prayers.
- 0030 USA, KTVN Salt Lk City UT: The Living Way. Jack Hayford preaches from The Church on the Way in Van Nuys, California.
- 0035 Iran, VOIRI: News.

## Tuesdays

- 0000 USA, KTVN Salt Lk City UT: Doctor to Doctor. Helen Pensanti, M.D. hosts a lively discussion-oriented show with doctors from across the U.S.
- 0000 USA, WTJC Newport NC: News and Weather.
- 0005 USA, WTJC Newport NC: The Bible in Living sound.
- 0020 USA, WTJC Newport NC: Music.
- 0030 Iran, VOIRI: Opening Prayers.
- 0030 USA, KTVN Salt Lk City UT: Get Ready. See S 2300.
- 0030 USA, WTJC Newport NC: Explore the Word.
- 0035 Iran, VOIRI: News.
- 0035 USA, WTJC Newport NC: Music.

## Wednesdays

- 0000 USA, KTVN Salt Lk City UT: Pastor Jentezen

Franklin. New program.

- 0000 USA, WTJC Newport NC: News and Weather.
- 0005 USA, WTJC Newport NC: The Bible in Living sound.
- 0020 USA, WTJC Newport NC: Music.
- 0030 Iran, VOIRI: Opening Prayers.
- 0030 USA, KTVN Salt Lk City UT: Dr. Mark Chironna. See W 0000.
- 0030 USA, WTJC Newport NC: Explore the Word.
- 0035 Iran, VOIRI: News.
- 0035 USA, WTJC Newport NC: Music.

## Thursdays

- 0000 USA, KTVN Salt Lk City UT: Praise the Lord. See S 0500.
- 0000 USA, WTJC Newport NC: News and Weather.
- 0005 USA, WTJC Newport NC: The Bible in Living sound.
- 0020 USA, WTJC Newport NC: Music.
- 0030 Iran, VOIRI: Opening Prayers.
- 0030 USA, WTJC Newport NC: Explore the Word.
- 0035 Iran, VOIRI: News.
- 0035 USA, WTJC Newport NC: Music.

## Fridays

- 0000 USA, KTVN Salt Lk City UT: Jerry Barnard. Services from the Cathedral of Faith in San Jose, CA.
- 0000 USA, WTJC Newport NC: News and Weather.
- 0005 USA, WTJC Newport NC: The Bible in Living sound.
- 0020 USA, WTJC Newport NC: Music.
- 0030 Iran, VOIRI: Opening Prayers.
- 0030 USA, KTVN Salt Lk City UT: Myles Munroe. Myles Munroe evangelizes.
- 0030 USA, WTJC Newport NC: Explore the Word.
- 0035 Iran, VOIRI: News.

- 0035 USA, WTJC Newport NC: Music.

## Saturdays

- 0000 Merlin Network One: Global Sound Kitchen.
- 0000 USA, KTVN Salt Lk City UT: Praise the Lord. See S 0500.
- 0000 USA, WTJC Newport NC: News and Weather.
- 0005 USA, WTJC Newport NC: The Bible in Living sound.
- 0020 USA, WTJC Newport NC: Music.
- 0030 Iran, VOIRI: Opening Prayers.
- 0030 USA, WTJC Newport NC: Explore the Word.
- 0035 Iran, VOIRI: News.
- 0035 USA, WTJC Newport NC: Music.
- 0047 Iran, VOIRI: Political Commentary.
- 0057 Iran, VOIRI: Listeners' Special.

## Longwave Resources

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Kevin Carey

P.O. Box 56, W. Bloomfield, NY 14585

## FREQUENCIES

0100-0200	Anguilla, Caribbean Beacon	6090am			
0100-0200 vl	Australia, ABC/Katherine	5025do			
0100-0200 vl	Australia, ABC/Tent Creek	4910do			
0100-0200	Australia, Radio	9660as	12080as	15240as	15415as
		17580as	17750as	17795as	21725as
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0156	China, China Radio Intl	9570na			
0100-0200	Costa Rica, RF Peace Intl	6975va	15050va		
0100-0200	Cuba, Radio Havana	6000na	9820na	11705na	13605na
0100-0127	Czech Rep, R Prague Intl	7345na	9665na		
0100-0200	Ecuador, HCJB	9745na	12015na	21455va	
0100-0145	Germany, Deutsche Welle	6040na	6145am	9765na	
0100-0130 s	Germany, Universal Life	9495as			
0100-0130 m	Germany, V O Deliverance	6120na			
0100-0200 s	Germany, Good News World R	9855eu			
0100-0200 vl	Guatemala, Radio Cultural	3300do			
0100-0200	Indonesia, Voice of	9525va			
0100-0130	Iran, VOIRI	9022am	9795ca	11970na	
0100-0110	Italy, RAI Intl	6010na	9675na	11800na	
0100-0200	Japan, Radio/NHK	9660me	11860as	11870me	15325as
		15590as	17685au	17835sa	21670pa
0100-0200	Kenya, Kenya BC Corp	4885do			
0100-0130	Kiribati, Radio	9810do			
0100-0200	Liberia, LCN/R Liberia Int	5100do			
0100-0200	Malaysia, Radio	7295do			
0100-0200 vl	Malaysia, RTM Kota Kinabalu	5980do			
0100-0200	Namibia, NBC	3270af	3289af		
0100-0125	Netherlands, Radio	6165na	9845na		
0100-0200	New Zealand, R NZ Intl	17675va			
0100-0156	North Korea, R Pyongyang	3560va	11735va	15229va	17734va
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC R Intl	15175as			
0100-0130 mtwhfa	Serbia, Radio Yugoslavia	7115na			
0100-0200	Singapore, R Corp Singapore	6150do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300ca	9440sa	
0100-0200 vl	Solomon Islands, SIBC	5020do			
0100-0200	Spain, R Exterior Espana	6055na			
0100-0200	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9730as
0100-0130	Switzerland, Swiss R Intl	15425as			
0100-0200	UK, BBC World Service	9885am	9905am	6175na	6195as
		5965as	5975na	9915am	11955as
		9410as	9590am	9915am	11955as
		12095sa	15280as	15310as	15360as
		17790as			
0100-0200 a	UK, Merlin Network One	3985eu	6180eu	7165eu	
0100-0200	Ukraine, R Ukraine Intl	5905eu	6020va	6030na	6080eu
		7205eu	7420eu	9560eu	9610eu
		9785na	9810va		
0100-0200	USA, Armed Forces Network	4278am	6478am	12689am	
0100-0200	USA, KAIJ Dallas TX	5835va			
0100-0200	USA, KJES Vado NM	7555na			
0100-0200	USA, KTBN Salt Lk City UT	7510na			
0100-0200	USA, KWHR Naalehu HI	17510as			
0100-0200	USA, Voice of America	7200as	9740as	9850as	15300as
		15300as	17740as	17820as	
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9455af
		9775am	13740am		
0100-0200	USA, WBCQ Monticello ME	7415na			
0100-0200	USA, WEWN Birmingham AL	5825na	9355eu		
0100-0200	USA, WGTG McCaysville GA	5085va	6890am		
0100-0200	USA, WHRA Greenbush ME	7580na			
0100-0200	USA, WHRI Noblesville IN	5745na	7315na		
0100-0200	USA, WINB Red Lion PA	11950am			
0100-0200	USA, WJCR Upton KY	7490na	13595na		
0100-0145 m	USA, WRMI/R Miami Intl	9955am			
0100-0200	USA, WRNO New Orleans LA	7355na			
0100-0200	USA, WSHB Cypress Crk SC	7535na	9430am	15285ca	
0100-0200	USA, WTJC Newport NC	9370na			
0100-0200 as	USA, WWBS Macon GA	11900na			
0100-0200	USA, WWCN Nashville TN	3215na	5070na	5935na	7435na
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	11750as	
0100-0130	Uzbekistan, R Tashkent	9540as			
0100-0127	Vietnam, Voice of	5940na			
0115-0145 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0130-0145	Albania, R Tirana Intl	6115na	7160na		
0130-0200	Sweden, Radio	7290as	9495al		
0130-0200	UK, RTE Radio	6155eu			
0130-0200 twhfa	USA, VOA Special English	7405am	9775am		
0140-0150	Greece, Voice of	7450na	9375na	9420na	
0140-0200	Vatican City, Vatican R	7335as	9650au	12055va	
0145-0200 twhfa	USA, WRMI/R Miami Intl	9955am			

## SELECTED PROGRAMS

## Sundays

0100	Czech Rep, Radio Prague: News. World news summary.	0130	USA, WTJC Newport NC: Word of Life (Spanish).
0100	USA, KTBN Salt Lk City UT: In Touch. The Atlanta Bible-teaching ministry of Charles Stanley.	0140	Greece, Voice of: News. See S 0140.
0100	USA, WTJC Newport NC: The Spoken Word of God.	0145	USA, WTJC Newport NC: Music.
0105	USA, WTJC Newport NC: Music.		
0113	Czech Rep, Radio Prague: The Magic Carpet. Classical music from the Czech Republic and neighboring countries.		
0115	USA, WTJC Newport NC: Pastor Norman Marks.		
0130	Albania, R Tirana Intl: News.		
0140	Greece, Voice of: News. World news in English.		
0145	USA, WTJC Newport NC: Music.		

## Mondays

0100	Czech Rep, Radio Prague: News. See S 0100.		
0100	USA, KTBN Salt Lk City UT: The Living Way (from 0030). See M 0030.		
0100	USA, WTJC Newport NC: Missions in Focus.		
0105	Czech Rep, Radio Prague: From the Weeklies. See S 1134.		
0111	Czech Rep, Radio Prague: A Letter from Prague. See S 1141.		
0115	USA, WTJC Newport NC: Music.		
0116	Czech Rep, Radio Prague: Readings from Czech Literature. See S 1146.		
0130	Albania, R Tirana Intl: News.		
0130	RTE Ireland: News from Ireland. A half-hour of news from Dublin.		
0130	USA, KTBN Salt Lk City UT: Taking Authority. Bishop Eddie Long preaches from the New Birth Missionary Baptist Church in Decatur, Georgia.		

## Tuesday-Saturday

0100	Czech Rep, Radio Prague: News. See S 0100.		
0100	USA, KTBN Salt Lk City UT: Behind the Scenes. See S 0630.		
0100	USA, WTJC Newport NC: Viewpoint on the Home.		
0104	Czech Rep, Radio Prague: Current Affairs. See M 1134.		
0120	USA, WTJC Newport NC: Music.		
0130	Albania, R Tirana Intl: News.		
0130	USA, WTJC Newport NC: World Wide Update.		
0135	USA, WTJC Newport NC: Music.		
0140	Albania, R Tirana Intl: Press Review.		
0140	Greece, Voice of: News. See S 0140.		

## Tuesdays

0115	USA, WTJC Newport NC: Fisherman's 5-Minute Look at the Book.		
0116	Czech Rep, Radio Prague: One on One. See M 1146.		
0130	RTE Ireland: News from Ireland. See CAm 0130.		
0130	USA, KTBN Salt Lk City UT: The Voice of Power. RW Schambach preaches from Tyler, Texas.		

## Wednesdays

0115	USA, WTJC Newport NC: Fisherman's 5-Minute Look at the Book.		
0116	Czech Rep, Radio Prague: Talking Point. See T 1146.		
0130	RTE Ireland: News from Ireland. See CAm 0130.		
0130	USA, KTBN Salt Lk City UT: Up on Melody Mountain. Betty Jean Robinson sings in Brentwood, Tennessee.		

## Thursdays

0104	Czech Rep, Radio Prague: Current Affairs. See M 1134.		
0115	USA, WTJC Newport NC: Fisherman's 5-Minute Look at the Book.		
0130	RTE Ireland: News from Ireland. See CAm 0130.		
0130	USA, KTBN Salt Lk City UT: Changing Your World. See M 0230.		

## Fridays

0104	Czech Rep, Radio Prague: Current Affairs. See M 1134.		
0115	USA, WTJC Newport NC: Fisherman's 5-Minute Look at the Book.		
0118	Czech Rep, Radio Prague: Mailbox. Peter Smith provides information about the Czech Republic, commentary on listener letters, and occasional DX news.		
0130	RTE Ireland: News from Ireland. See CAm 0130.		
0130	USA, KTBN Salt Lk City UT: International Intelligence Briefing. See S 0600.		

## Saturdays

0104	Czech Rep, Radio Prague: Current Affairs. See M 1134.		
0110	Czech Rep, Radio Prague: Living Czech. See F 2340.		
0114	Czech Rep, Radio Prague: Mailbox. See F 0118.		
0115	USA, WTJC Newport NC: Fisherman's 5-Minute Look at the Book.		
0130	USA, KTBN Salt Lk City UT: Lakewood Church. John Osteen preaches from Houston, Texas.		



## FREQUENCIES

0200-0300	Anguilla, Caribbean Beacon	6090am				0200-0300	Sri Lanka, Sri Lanka BC	6005as	6075as	6130do	9730as
0200-0300 twhfa	Argentina, RAE	11710am						15425as			
0200-0300 vl	Australia, ABC/Katherine	5025do				0200-0300	Taiwan, Radio Taiwan Intl	5950na	9680na	11740as	11825pa
0200-0300 vl	Australia, ABC/Tent Creek	4910do						15345as			
0200-0300	Australia, Radio	9660as	12080as	15240as	15415as	0200-0300	UK, BBC World Service	5975na	6135am	6175na	6185am
		15515as	17580as	17750as	21725as			9410as	9770af	9915eu	11955as
		4880as						12095sa	15280as	15310as	17790as
0200-0210	Bangladesh, Bangla Betar	4880as				0200-0206 a	UK, BBC World Service	6195as			
0200-0300	Canada, CBC N Quebec Svc	9625do				0200-0300	USA, Armed Forces Network	4278am	6458am	12689am	
0200-0300	Canada, CFRX Toronto	6070do				0200-0300	USA, KAIJ Dallas TX	5835na			
0200-0300	Canada, CFVP Calgary	6030do				0200-0230	USA, KJES Vado NM	7555na			
0200-0300	Canada, CHNX Halifax	6130do				0200-0300	USA, KTVN Salt Lk City UT	7510na			
0200-0300	Canada, CKZN St John's	6160do				0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0300	Canada, CKZU Vancouver	6160do				0200-0300	USA, Voice of America	7200as	9740as	9850as	11705as
0200-0300	Canada, Radio Canada Intl	6155am	9535am	9755am	9780am			15250as	15300as	17740as	17820as
		11865am				0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0300	Costa Rica, RF Peace Intl	6975va	15050va			0200-0300	USA, WEWN Birmingham AL	5825na			
0200-0205	Croatia, Croatian Radio	7280na				0200-0300	USA, WGTG McCaysville GA	5085va	6890am		
0200-0300	Cuba, Radio Havana	6000na	9820na	11705na	13605na	0200-0300	USA, WHRA Greenbush ME	7580na			
0200-0227	Czech Rep, R Prague Intl	6200na	7345na			0200-0300	USA, WHRI Noblesville IN	5745na	7315sa		
0200-0300	Ecuador, HCJB	9745na	12015na	21455va		0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	Egypt, Radio Cairo	9475am				0200-0300	USA, WJCR Upton KY	7490na	13595na		
0200-0245	Germany, Deutsche Welle	7285as	11965as			0200-0300 mtwhfa	USA, WRMI/R Miami Intl	7385am			
0200-0230	Hungary, Radio Budapest	9835na				0200-0300	USA, WRNO New Orleans LA	7355na			
0200-0300	Kenya, Kenya BC Corp	4935do				0200-0300	USA, WSHB Cypress Crk SC	5850na	7535ca	9430na	
0200-0300	Malaysia, Radio	7295do				0200-0300	USA, WTJC Newport NC	9370na			
0200-0230	Myanmar, Radio	7185do				0200-0300	USA, WWCN Nashville TN	3215na	5070na	5935na	7435na
0200-0300	Namibia, NBC	3270af	3289af			0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200-0300	New Zealand, R NZ Intl	17675va				0215-0220	Nepal, Radio	3230as	5005as		
0200-0256	North Korea, R Pyongyang	11844va	13649va			0230-0300	Austria, R Austria Intl	7325na			
0200-0300 vl	Papua New Guinea, NBC	9675do				0230-0245	Pakistan, Radio	9640as	15485as	17660as	17895as
0200-0256	Romania, R Romania Intl	9510as	9570na	9690as	11740as	0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
		11830as	11940as			0230-0300	Sweden, Radio	7290na	9495al		
0200-0300	Russia, Voice of Russia WS	7180na	12020na	13665na	15470na	0230-0257	Vietnam, Voice of	5940na	9605am		
0200-0230	Serbia, Radio Yugoslavia	7130na				0250-0300	Vatican City, Vatican R	7305am			
0200-0300	Singapore, R Corp Singapore	6150do				0257-0300 vl	Malawi, MBC	3380do			
0200-0300 vl	Solomon Islands, SIBC	5020do									
0200-0300	South Korea, R Korea Intl	7275as	11725sa	11810sa	15575na						

## SELECTED PROGRAMS

## Sundays

- 0200 Czech Rep, Radio Prague: News. See S 0100.  
 0200 USA, KTVN Salt Lk City UT: The Hour of Power. Robert Schuller conducts services from the Crystal Cathedral.  
 0200 USA, WTJC Newport NC: News and Weather.  
 0205 USA, WTJC Newport NC: Sounds of Joy.  
 0213 Czech Rep, Radio Prague: The Magic Carpet. See S 0113.  
 0235 USA, WTJC Newport NC: Music.

## Mondays

- 0200 Czech Rep, Radio Prague: News. See S 0100.  
 0200 USA, KTVN Salt Lk City UT: The Believer's Voice of Victory. Kenneth and Gloria Copeland come into your listening room from Fort Worth, Texas.  
 0200 USA, WTJC Newport NC: News and Weather.  
 0204 Czech Rep, Radio Prague: From the Weeklies. See S 1134.  
 0205 USA, WTJC Newport NC: What Does the Bible Say?  
 0211 Czech Rep, Radio Prague: A Letter from Prague. See S 1141.  
 0216 Czech Rep, Radio Prague: Readings from Czech Literature. See S 1146.  
 0230 UK, BBC London (AF): R&B with DJ EE. See W 0530.  
 0230 USA, KTVN Salt Lk City UT: Changing Your World. Creflo A. Dollar, Jr. evangelizes.  
 0235 USA, WTJC Newport NC: Music.

## Tuesdays

- 0200 Czech Rep, Radio Prague: News. See S 0100.  
 0200 USA, KTVN Salt Lk City UT: Dino. Christian music from Branson, Missouri.  
 0200 USA, WTJC Newport NC: News and Weather.  
 0204 Czech Rep, Radio Prague: Current Affairs. See M 1134.

- 0205 USA, WTJC Newport NC: Selected Programming.  
 0216 Czech Rep, Radio Prague: One on One. See M 1146.  
 0230 USA, KTVN Salt Lk City UT: Jesse Duplantix. Evangelizing from New Orleans.

## Wednesdays

- 0200 Czech Rep, Radio Prague: News. See S 0100.  
 0200 USA, KTVN Salt Lk City UT: Cornerstone. Evangelizing by John Hagee and music by the Cornerstone Choir.  
 0200 USA, WTJC Newport NC: News and Weather.  
 0204 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
 0205 USA, WTJC Newport NC: Selected Programming.  
 0216 Czech Rep, Radio Prague: Talking Point. See T 1146.  
 0230 UK, BBC London (AE): The Bitter Pill (1st, 8th, 15th). See T 1130.

## Thursdays

- 0200 Czech Rep, Radio Prague: News. See S 0100.  
 0200 USA, KTVN Salt Lk City UT: Get Ready. See S 2300.  
 0200 USA, WTJC Newport NC: News and Weather.  
 0204 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
 0205 USA, WTJC Newport NC: Selected Programming.  
 0216 Czech Rep, Radio Prague: Ten Years After. See W 1116.  
 0230 UK, BBC London (AS): R&B with DJ EE. See W 0530.  
 0230 USA, KTVN Salt Lk City UT: Precious Memories. Bill

Gaither.

## Fridays

- 0200 Czech Rep, Radio Prague: News. See S 0100.  
 0200 USA, KTVN Salt Lk City UT: Get Ready. See S 2300.  
 0200 USA, WTJC Newport NC: News and Weather.  
 0205 USA, WTJC Newport NC: Selected Programming.  
 0206 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
 0218 Czech Rep, Radio Prague: Mailbox. See F 0118.  
 0225 Czech Rep, Radio Prague: Music. See M 1426.  
 0230 USA, KTVN Salt Lk City UT: This is Your Day! See M 1130.

## Saturdays

- 0200 Czech Rep, Radio Prague: News. See S 0100.  
 0200 USA, KTVN Salt Lk City UT: Ever Increasing Faith. Dr. Frederick K.C. Price evangelizes.  
 0200 USA, WTJC Newport NC: News and Weather.  
 0204 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
 0205 USA, WTJC Newport NC: Selected Programming.  
 0210 Czech Rep, Radio Prague: Living Czech. See F 2340.  
 0214 Czech Rep, Radio Prague: Mailbox. See F 0118.  
 0226 Czech Rep, Radio Prague: Music. See M 1426.

## HAUSER'S HIGHLIGHTS

## MALAWI: MBC

Included with QSL, note: "periodically we do change our Frequency Schedules to suit changing times and at the moment our schedule remains as follows":

UTC	kHz	kW
0257-0810	3380	50
0357-0810	5995	50
1515-2210	3380	50

(Gayle Van Horn)



0300-0400	Anguilla,Caribbean Beacon	6090am				0300-0400	Uganda, Radio	4976do			
0300-0400 vl	Australia, ABC/Katherine	5025do				0300-0400	UK, BBC World Service	3255af	5975na	6005af	6135am
0300-0400 vl	Australia, ABC/Tent Creek	4910do						6175na	6190af	6195eu	7160af
0300-0400	Australia, Radio	9660as	12080as	15240as	15415as			9410eu	11730af	11760me	11765af
		15515as	17580as	17750as	21275as			11955as	12095af	15310as	15360as
0300-0330 smwfa	Belarus, R Minsk	6070eu				0300-0400 smtwhf	UK, BBC World Service	15280as			
0300-0400 vl	Botswana, Radio	4820do	7255do			0300-0330	UK, Merlin Network One	9735am			
0300-0400	Bulgaria, Radio	7375na	9400na			0300-0400	USA, Armed Forces Network	4278am	6458am	12689am	
0300-0400	Canada, CBC N Quebec Svc	9625do				0300-0400	USA, KAIJ Dallas TX	5835va			
0300-0400	Canada, CFRX Toronto	6070do				0300-0400	USA, KBTN Salt Lk City UT	7510na			
0300-0400	Canada, CFVP Calgary	6030do				0300-0400 vl	USA, KVOH Los Angeles CA	9975am			
0300-0400	Canada, CHNX Halifax	6130do				0300-0400	USA, KWHR Naalehu HI	17510as			
0300-0400	Canada, CKZN St John's	6160do				0300-0400	USA, Voice of America	6035af	6080af	7105af	7290af
0300-0400	Canada, CKZU Vancouver	6160do						7340af	7415af	9575af	9885af
0300-0329	Canada, Radio Canada Intl	6155na	9755na	9780na		0300-0330 mtwh	USA, Voice of America	4960af			
0300-0356	China, China Radio Intl	9690am				0300-0400	USA, WBCQ Monticello ME	7415na			
0300-0400	Costa Rica,RF Peace Intl	6975va	15050va			0300-0400	USA, WEWN Birmingham AL	5825na			
0300-0305	Croatia, Croatian Radio	7280na				0300-0400	USA, WGTG McCaysville GA	5085va	6890am		
0300-0400	Cuba, Radio Havana	6000na	9820na	11705na	13605na	0300-0400	USA, WHRA Greenbush ME	7580na			
0300-0400	Ecuador, HCJB	9745na	12015na	21455va		0300-0400	USA, WHRI Noblesville IN	5745na	7315sa		
0300-0330	Egypt, Radio Cairo	9475am				0300-0400	USA, WINB Red Lion PA	11950am			
0300-0330	Finland, YLE/R Finland	9655na	11665na			0300-0400	USA, WJCR Upton KY	7490na	13595na		
0300-0320 m	Finland, YLE/R Finland	9655eu	11665eu			0300-0400	USA, WWRN New Orleans LA	7395na			
0300-0345	Germany, Deutsche Welle	6045na	9535na	11750na		0300-0400	USA, WSHB Cypress Crk SC	5850na	7535eu		
0300-0310 mtwhf	Greece, Voice of	7450na	9375na	9420na	12105na	0300-0400	USA, WTJC Newport NC	9370na			
0300-0400 vl	Guatemala, Radio Cultural	3300do				0300-0400	USA, WWCN Nashville TN	3215na	5070na	5935na	7435na
0300-0400 irreg	Iraq, Radio Iraq Intl	9685va	11787va			0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0400	Japan, Radio/NHK	17825ca	21610pa			0300-0315	Vatican City, Vatican R	7305am	9605am		
0300-0400	Kenya, Kenya BC Corp	4885do	4935do			0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400 vl	Lesotho, Radio	4800do				0300-0400 vl	Zimbabwe, Zimbabwe BC	3396do			
0300-0400	Malaysia, Radio	7295do				0305-0320 mtwhfa	UK, BBC World Service	15360as			
0300-0400	Malaysia, Voice of	6175as	9750as	15295as		0310-0315 thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0300-0400	Namibia, NBC	3270af	3289af			0310-0340	Vatican City, Vatican R	9660af			
0300-0400	New Zealand, R NZ Intl	17675va				0329-0359 sm	Canada, Radio Canada Intl	6155na	9755na	9780na	
0300-0400	Oman, Radio Sultanate ofm	15355va				0330-0400	Albania, R Tirana Intl	6115na	7160na		
0300-0330	Pakistan, Radio	6070do				0330-0400	Hungary, Radio Budapest	9835na			
0300-0400 vl	Papua New Guinea, NBC	9675do				0330-0357	Libya, Voice of Africa	15235va	15415va	15435va	
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as		0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0300-0400	Russia,Voice of Russia WS	5940na	7180na	12020na	13665na	0330-0357	Russia,Voice of Russia WS	7260na			
		15470na				0330-0400	Sweden, Radio	9495na			
0300-0330	S Africa, AWR Africa	9835af				0330-0400	Tanzania, Radio	5050af			
0300-0330	S Africa, Channel Africa	9525af				0330-0400	UAE, Radio Dubai	12005na	13675na	15400na	21485na
0300-0400	Singapore,RCorp Singapore	6150do				0330-0357	Vietnam, Voice of	7260sa			
0300-0400	Sri Lanka, Sri Lanka BC	6005as	6075as	6130do	9730as	0340-0350	Greece, Voice of	7450na	9375na	9420na	
		15425as				0345-0400	Tajikistan, Radio	7245as	9905as	11620as	
0300-0400	Taiwan, Radio Taiwan Intl	5950na	9680na	11740as	11825as	0357-0400 vl	Malawi, MBC	5993do			
		15345as				0359-0400	Zambia, Christian Voice	6065do			
0300-0330	Thailand, Radio	9655am	11905am	15460na							

## SELECTED PROGRAMS

0300 USA, KTBN Salt Lk City UT: Carman. Helping youth to think through problems and find positive answers.

0300 USA, WTJC Newport NC: Music.

0330 Albania, R Tirana Intl: News.

0330 USA, KTBN Salt Lk City UT: Power Connection. John Jacobs and the power team perform feats of strength.

0337 Albania, R Tirana Intl: Press Review.

0340 Albania, R Tirana Intl: Reality.

0340 Greece. Voice of: News. See S 0140.

0300	USA, KTVB Salt Lk City UT: Praise the Lord. See S 0500.
0300	USA, VOA Washington DC (af): Daybreak Africa. Magazine program of African news, sports, features and correspondent reports.
0300	USA, WTJC Newport NC: Family Altar.
0330	Albania, R Tirana Intl: News.
0330	USA, WTJC Newport NC: Music.
0340	Greece, Voice of: News. See S 0140.
0346	Albania, R Tirana Intl: Music at Your Request.

0300 USA, KTNB Salt Lk City UT: Praise the Lord (live). See S 0500.

0300 USA, VOA Washington DC (af): Daybreak Africa. See Af 0300.

0300 USA, WTJC Newport NC: Selected Programming.  
0315 USA, WTJC Newport NC: Pastor Normal Marks.  
0330 Albania, R Tirana Intl: News.  
0330 USA, WTJC Newport NC: Keys to Family Living.  
0340 Greece, Voice of: News. See S 0140.  
0346 Albania, R Tirana Intl: Feature Program.

0300 USA, KTVB Salt Lk City UT: Praise the Lord (live). See S 0500.

0300 USA, VOA Washington DC (af): Daybreak Africa. See Af 0300.

0300 USA, WTJC Newport NC: Selected Programming.

0315 USA, WTJC Newport NC: Pastor Normal Marks.

0330 Albania, R Tirana Int: News.

0330 USA, WTJC Newport NC: Keys to Family Living.

0337 Albania, R Tirana Int: PO Box Radio Tirana.

0340 Greece, Voice of: News. See S 0140.

0343 Albania, R Tirana Int: Music.

0353 Albania, R Tirana Int: Press Review.

0300 USA, KTVB Salt Lake City UT: Praise the Lord (live). See S  
0500.

0300 USA, VOA Washington DC (af): Daybreak Africa. See Af  
0300.

0300 USA, WTJC Newport NC: Selected Programming.

0315 USA, WTJC Newport NC: Pastor Normal Marks.

0330 Albania, R Tirana Intl: News.

0330 USA, WTJC Newport NC: Keys to Family Living.

0340 Greece, Voice of: News. See S 0140.  
0341 Albania, R Tirana Intl: Albanian Press Review.  
0345 Albania, R Tirana Intl: Musical Program of the Week.

0300 USA, RTBN Salt Lk City UT: Praise the Lord (live). See S 0500.

0300 USA, VOA Washington DC (af): Daybreak Africa. See AF 0300.

0300 USA, WTJC Newport NC: Selected Programming.

0315 USA, WTJC Newport NC: Pastor Normal Marks.

0330 Albania, R Tirana Intl: News.

0330 USA, WTJC Newport NC: Keys to Family Living.

0337 Albania, R Tirana Intl: Press Review.

0340 Greece, Voice of: News. See S 0140.

0344 Albania, R Tirana Intl: Current Affairs.

0348 Albania, R Tirana Intl: Music.

0300	Merlin Network One: Celtic Notes (Wales Radio International).
0300	USA, KTBN Salt Lk City UT: Praise the Lord (live). See S 0500.
0300	USA, WTJC Newport NC: Selected Programming.
0315	USA, WTJC Newport NC: Pastor Normal Marks.
0330	Albania, R Tirana Intl: News.
0330	USA, WTJC Newport NC: Keys to Family Living.
0340	Greece, Voice of: News. See S 0140.
0344	Albania, R Tirana Intl: Horizon.

## FREQUENCIES

0400-0500	Anguilla, Caribbean Beacon	6090am				0400-0500	UK, BBC World Service	3255af	3955eu	5975na	6005af
0400-0500 vl	Australia, ABC/Katherine	5025do						6135am	6175na	6190af	6195eu
0400-0500 vl	Australia, ABC/Tent Creek	4910do						7160af	9410eu	11760me	11765af
0400-0500	Australia, Radio	9660as	12080as	15240as	15415as			11955as	12095af	15310as	15420af
		15515as	17580as	17750as	21725as			15575as	17760as	17790as	21660as
0400-0430	Belgium, R Vlaanderen Intl	11980am				0400-0500	Ukraine, R Ukraine Intl	4820eu	6020va	6030na	6080eu
0400-0500 vl	Botswana, Radio	4820do	7255do					7205eu	7420eu	9600eu	9610eu
0400-0500	Canada, CBC N Quebec Svc	9625do						9785va			
0400-0500	Canada, CFRX Toronto	6070do				0400-0500	USA, Armed Forces Network	4278am		12689am	
0400-0500	Canada, CFVP Calgary	6030do				0400-0500	USA, KAIJ Dallas TX	5835va			
0400-0500	Canada, CHNX Halifax	6130do				0400-0500	USA, KLTN Salt Lk City UT	7510na			
0400-0500	Canada, CKZN St John's	6160do				0400-0500 vl	USA, KVOH Los Angeles CA	9975am			
0400-0500	Canada, CKZU Vancouver	6160do				0400-0500	USA, KWHR Naalehu HI	17780as			
0400-0429 as	Canada, Radio Canada Intl	9505me	9645me			0400-0500	USA, Voice of America	6035af	6080af	7170af	7290af
0400-0429 mtwhf	Canada, Radio Canada Intl	9535af	9690af	11795af				7415af	9575af	9775af	9885af
0400-0456	China, China Radio Intl	9730na				0400-0500	USA, WBCQ Monticello ME	7415na			
0400-0500	Costa Rica, RF Peace Intl	6975va	15050va			0400-0500	USA, WEWN Birmingham AL	5825na			
0400-0405	Croatia, Croatian Radio	7285na				0400-0500	USA, WGTG McCaysville GA	5085va	6890am		
0400-0500	Cuba, Radio Havana	6000na	9820na	11705na	13605na	0400-0500	USA, WHRA Greenville ME	7580na			
0400-0427	Czech Rep, R Prague Intl	7345na	7465na	9435na		0400-0500	USA, WHRI Noblesville IN	5745na	7315sa		
0400-0500	Ecuador, HCJB	9745na	12015na	21455va		0400-0500	USA, WINB Red Lion PA	11950am			
0400-0445	Germany, Deutsche Welle	7280af	9565af	9765af	11965af	0400-0500	USA, WJCR Upton KY	7490na	13595na		
0400-0500	Kenya, Kenya BC Corp	4885do	4935do			0400-0500	USA, WRMI/ R Miami Intl	7385na			
0400-0500 vl	Lesotho, Radio	4800do				0400-0500	USA, WRNO New Orleans LA	7395na			
0400-0500 vl	Malawi, MBC	3380do	5995do			0400-0500	USA, WSHB Cypress Crk SC	7535eu	9840af	12020af	
0400-0500	Malaysia, Radio	7295do				0400-0500	USA, WTJC Newport NC	9370na			
0400-0430 stwhfa	Mexico, Radio Mexico Intl	9705am				0400-0500	USA, WWCR Nashville TN	2390na	3215na	5070na	5935na
0400-0500	Namibia, NBC	3270af	3289af			0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985na	
0400-0500	New Zealand, R NZ Intl	17675va				0400-0500	Zambia, Christian Voice	6065do			
0400-0500 vl	Papua New Guinea, NBC	9675do				0400-0500	Zambia, Natl BC Corp	6165do	6265do		
0400-0456	Romania, R Romania Intl	9570na	11830as	15335as	17735as	0400-0500 vl	Zimbabwe, Zimbabwe BC	3396do			
0400-0500	Russia, Voice of Russia WS	7125na	7180na	12010na	12020na	0425-0440 vl	Italy, RAI Intl	5975af	7150af		
		15470na	15595na	17595na	17660na	0430-0500 mtwhf	Canada, Radio Canada Intl	9690af	11795af		
0400-0500	S Africa, Channel Africa	5955af				0430-0457	Czech Rep, R Prague Intl	9865va	11600va		
0400-0500	Singapore, R Corp Singapore	6150do				0430-0455	Moldova, R Moldova Intl	7500am			
0400-0430	Sri Lanka, Sri Lanka BC	6005as	6075as	6130do	9730as	0430-0500	Netherlands, Radio	6165na	9590na		
		15425as				0430-0500 vl	Nigeria, Radio/Ibadan	6050do			
0400-0500	Switzerland, Swiss R Intl	9885am	9905am			0430-0500 vl	Nigeria, Radio/Kaduna	4770do			
0400-0430	Tanzania, Radio	5050af				0430-0500	Nigeria, Radio/Lagos	3326do			
0400-0500	Turkey, Voice of	6010va	7240as	21715as		0430-0500	Swaziland, Trans World R	3200af	4775af		
0400-0500	Uganda, Radio	4976do				0455-0500	Malaysia, Voice of	6175as	9750as	15295as	
						0455-0500	Nigeria, Voice of	7255af	15120va		

## SELECTED PROGRAMS

## Sundays

- 0400 Belgium, R Vlaanderen Intl: Brussels Calling. Belgium's shortwave broadcasts have been reduced this season to four a day. The 1300 broadcast is the only broadcast specifically for North America.
- 0400 Czech Rep, Radio Prague: News. See S 0100.
- 0400 USA, KLTN Salt Lk City UT: Eastman Curtis Live. A youth-oriented program.
- 0400 USA, WTJC Newport NC: News and Weather.
- 0401 Belgium, R Vlaanderen Intl: Music from Flanders. The weekly concert.
- 0405 USA, WTJC Newport NC: Music.
- 0413 Czech Rep, Radio Prague: The Magic Carpet. See S 0113.
- 0430 Czech Rep, Radio Prague: News. See S 0100.
- 0430 USA, KLTN Salt Lk City UT: Teen Mania. Ron Luce encourages teens to discover a purpose for their lives.
- 0443 Czech Rep, Radio Prague: The Magic Carpet. See S 0113.

## Mondays

- 0400 Belgium, R Vlaanderen Intl: Brussels Calling. See S 0400.
- 0400 Czech Rep, Radio Prague: News. See S 0100.
- 0400 USA, KLTN Salt Lk City UT: Praise the Lord. See S 0500.
- 0400 USA, WTJC Newport NC: News and Weather.
- 0401 Belgium, R Vlaanderen Intl: Radio World. See S 1234.
- 0404 Czech Rep, Radio Prague: From the Weeklies. See S 1134.
- 0405 USA, WTJC Newport NC: The Bible in Living Sound.
- 0411 Czech Rep, Radio Prague: A Letter from Prague. See S 1141.
- 0412 Belgium, R Vlaanderen Intl: Tourism. Take an audio tour of the sights and sounds of Belgium.
- 0415 Belgium, R Vlaanderen Intl: Brussels 1043. See S 1247.
- 0416 Czech Rep, Radio Prague: Readings from Czech Literature. See S 1146.

- 0425 Belgium, R Vlaanderen Intl: Soundbox. Belgium's popular music program.
- 0430 Czech Rep, Radio Prague: News. See S 0100.
- 0434 Czech Rep, Radio Prague: From the Weeklies. See S 1134.
- 0435 USA, WTJC Newport NC: Music.
- 0441 Czech Rep, Radio Prague: A Letter from Prague. See S 1141.
- 0446 Czech Rep, Radio Prague: Readings from Czech Literature. See S 1146.

## Tuesday-Saturday

- 0400 Belgium, R Vlaanderen Intl: Brussels Calling. See S 0400.
- 0400 Czech Rep, Radio Prague: News. See S 0100.
- 0400 USA, KLTN Salt Lk City UT: Praise the Lord (live). See S 0500.
- 0400 USA, WTJC Newport NC: News and Weather.
- 0404 Czech Rep, Radio Prague: Current Affairs. See M 1134.
- 0420 USA, WTJC Newport NC: Music.
- 0430 USA, WTJC Newport NC: Prophecy for Today.
- 0430 Czech Rep, Radio Prague: News. See S 0100.
- 0434 Czech Rep, Radio Prague: Current Affairs. See M 1134.

## Tuesdays

- 0405 USA, WTJC Newport NC: Light for the Pathway.
- 0406 Belgium, R Vlaanderen Intl: Press Review. See M 1236.
- 0410 Belgium, R Vlaanderen Intl: Focus on Europe. See M 1240.
- 0416 Belgium, R Vlaanderen Intl: Sports Report. See M 1246.
- 0416 Czech Rep, Radio Prague: One on One. See M 1146.
- 0420 Belgium, R Vlaanderen Intl: Soundbox. See M 0425.
- 0447 Czech Rep, Radio Prague: One on One. See M 1146.

## Wednesdays

- 0405 USA, WTJC Newport NC: Light for the Pathway.
- 0406 Belgium, R Vlaanderen Intl: Belgium Today. See T 1235.
- 0411 Belgium, R Vlaanderen Intl: Press Review. See M 1236.
- 0415 Belgium, R Vlaanderen Intl: Green Society. Environmental issues and health matters facing Belgium.

- 0416 Czech Rep, Radio Prague: Talking Point. See T 1146.
- 0420 Belgium, R Vlaanderen Intl: Soundbox. See M 0425.
- 0446 Czech Rep, Radio Prague: Talking Point. See T 1146.

## Thursdays

- 0405 USA, WTJC Newport NC: Light for the Pathway.
- 0406 Belgium, R Vlaanderen Intl: Belgium Today. See T 1235.
- 0410 Belgium, R Vlaanderen Intl: Press Review. See M 1236.
- 0416 Czech Rep, Radio Prague: Ten Years After. See W 1116.
- 0425 Belgium, R Vlaanderen Intl: Soundbox. See M 0425.

## Fridays

- 0405 USA, WTJC Newport NC: Light for the Pathway.
- 0406 Belgium, R Vlaanderen Intl: Belgium Today. See T 1235.
- 0410 Belgium, R Vlaanderen Intl: Press Review. See M 1236.
- 0416 Czech Rep, Radio Prague: Economic Report. See H 1144.
- 0424 Czech Rep, Radio Prague: Music. See M 1426.
- 0430 Czech Rep, Radio Prague: News. See S 0100.
- 0442 Czech Rep, Radio Prague: Press Review. See H 1142.
- 0444 Czech Rep, Radio Prague: Economic Report. See H 1144.
- 0450 Czech Rep, Radio Prague: I'd Like You to Meet. See H 1149.

## Saturdays

- 0405 Belgium, R Vlaanderen Intl: Belgium Today. See T 1235.
- 0405 USA, WTJC Newport NC: Light for the Pathway.
- 0409 Belgium, R Vlaanderen Intl: Press Review. See M 1236.
- 0410 Czech Rep, Radio Prague: Living Czech. See F 2340.
- 0414 Belgium, R Vlaanderen Intl: The Arts. See H 1244.
- 0414 Czech Rep, Radio Prague: Mailbox. See F 0118.
- 0419 Belgium, R Vlaanderen Intl: Tourism. See M 0412.
- 0425 Belgium, R Vlaanderen Intl: Soundbox. See M 0425.
- 0426 Czech Rep, Radio Prague: Music. See M 1426.
- 0438 Czech Rep, Radio Prague: Mailbox. See F 0118.
- 0455 Czech Rep, Radio Prague: Music. See M 1426.



0500-0600	Anguilla, Caribbean Beacon	6090am				0500-0505	Swaziland, Trans World R	3200af	4775af		
0500-0600 vl	Australia, ABC/Katherine	5025do				0500-0530	Switzerland, Swiss R Intl	9655eu			
0500-0600 vl	Australia, ABC/Tent Creek	4910do				0500-0600	Uganda, Radio	4976do			
0500-0600	Australia, Radio	9660as	12080as	15240as	15515as	0500-0600	UK, BBC World Service	3255af	3955eu	5975na	6005af
		17580as	21725as					6175am	6190af	6195eu	7160af
0500-0600 as	Australia, Radio	15415as	17750as					9410eu	9740as	11760me	11765af
0500-0600 vl	Botswana, Radio	4820do	7255do					11955pa	12095eu	15310as	15360as
0500-0600	Canada, CBC N Quebec Svc	9625do						15420af	15575as	17640af	17760as
0500-0600	Canada, CFRX Toronto	6070do						17790as	17885af	21660as	
0500-0600	Canada, CFVP Calgary	6030do				0500-0600	USA, Armed Forces Network	4278am	6458am	12689am	
0500-0600	Canada, CHNX Halifax	6130do				0500-0600	USA, KAJI Dallas TX	5835va			
0500-0600	Canada, CKZN St John's	6160do				0500-0600	USA, KTNB Salt Lk City UT	7510na			
0500-0600	Canada, CKZU Vancouver	6160do				0500-0600 vl	USA, KVOH Los Angeles CA	9975am			
0500-0556	China, China Radio Intl	9560na				0500-0600	USA, KWHR Naalehu HI	17780as			
0500-0600	Costa Rica,RF Peace Intl	6975va	15050va			0500-0600	USA, Voice of America	5970af	6035af	6080af	7170af
0500-0505	Croatia, Croatian Radio	7285na	9925na					7295af	9700af	9775af	11825eu
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na				12080af	15205as		
0500-0600	Ecuador, HCJB	9745na	12015na	21455va		0500-0600	USA, WBCQ Monticello ME	7415na			
0500-0545	Germany, Deutsche Welle	6100na	6120na	9670na	11795na	0500-0600	USA, WEWN Birmingham AL	5825na			
0500-0515	Israel, Kol Israel	7475va	9435va	11605va	17715au	0500-0600	USA, WGTG McCaysville GA	5085va	6890am		
0500-0600	Japan, Radio/NHK	6110na	7230eu	9835eu	11715as	0500-0600	USA, WHRA Greenbush ME	7435af			
		11760as	11840as	11850pa	15230pa	0500-0600	USA, WHRI Noblesville IN	5745na	7315sa		
		15590as				0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	Kenya, Kenya BC Corp	4885do	4935do			0500-0600	USA, WJCR Upton KY	7490na	13595na		
0500-0600	Kuwait, Radio	15110as				0500-0600 stwhfa	USA, WRMI/R Miami Intl	7385na			
0500-0600 vl	Lesotho, Radio	4800do				0500-0600	USA, WRNO New Orleans LA	7395na			
0500-0600	Liberia,LCN/R Liberia Int	5100do				0500-0600	USA, WSHB Cypress Crk SC	7535eu	9840af	12020af	
0500-0600 vl	Malawi, MBC	3380do	5995do			0500-0600	USA, WTJC Newport NC	9370na			
0500-0600	Malaysia, Radio	7295do				0500-0505	USA, WWCR Nashville TN	2390na	5070na	5935na	
0500-0600	Malaysia, RTM Sarawak	7160do				0500-0505 as	USA, WWCR Nashville TN	3210na			
0500-0600	Malaysia, Voice of	6175as	9750as	15295as		0500-0505 mtwhf	USA, WWCR Nashville TN	3215na			
0500-0530 twhfa	Mexico, Radio Mexico Intl	9705am				0500-0600	USA, WYFR Okeechobee FL	5985na	9355na	11550va	
0500-0525	Netherlands, Radio	6165na	9590na			0500-0530	Vatican City, Vatican R	9660af	11625af	15570af	
0500-0600	New Zealand, R NZ Intl	17675va				0500-0600	Zambia, Christian Voice	6065do			
0500-0600 vl	Nigeria, Radio/Ibadan	6050do				0500-0600	Zambia, Natl BC Corp	6165do	6265do		
0500-0600 vl	Nigeria, Radio/Kaduna	4770do				0500-0530 vl	Zimbabwe, Zimbabwe BC	3396do			
0500-0600	Nigeria, Radio/Lagos	3326do				0505-0600	Swaziland, Trans World R	3200af	4775af	9500af	
0500-0600	Nigeria, Voice of	7255af	15120va			0505-0600	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0500-0504	Pakistan, Radio	11725me	15175me	17555me		0515-0555 vl	Honduras, HRMI	5890am			
0500-0600 vl	Papua New Guinea, NBC	9675do				0520-0600 vl	Ghana, Ghana BC Corp	3366do	4915do		
0500-0600	Russia,Voice of Russia WS	7125na	7180na	7570as	12010na	0530-0600	Austria, R Austria Intl	6015na	6155va	13730na	15410eu
		12020na	15470na	15595na	17595na			17870va			
		17660na				0530-0600	Kiribati, Radio	9810do			
0500-0530	S Africa, AWR Africa	5960af	6010af			0530-0600 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0500-0600	S Africa, Channel Africa	15215af				0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0500-0600	Singapore,RCorp Singapore	6150do				0530-0600	UAE, Radio Dubai	15435au	17830au	21605au	21700au
0500-0600 vl	Solomon Islands, SIBC	5020do				0530-0600 vl	Zimbabwe, Zimbabwe BC	5975do			
0500-0600	Spain, R Exterior Espana	6055na									

## Sundays

0500	USA, KTBN Salt Lk City UT: Praise the Lord (live). Music, talk, and guest evangelists from the PTL Network.
0500	USA, WTJC Newport NC: News and Weather.
0505	USA, WTJC Newport NC: Dr. Charles Britt.
0530	USA, WTJC Newport NC: Music.
0550	USA, WTJC Newport NC: Music.

## Mondays

0500	USA, KTVN Salt Lk City UT: Power Connection. See S 0330.
0500	USA, WTJC Newport NC: News and Weather.
0505	USA, WTJC Newport NC: Gospel Hour.
0530	USA, KTVN Salt Lk City UT: E.V. Hill. Pastor Hill preaches.
0535	USA, WTJC Newport NC: Music.
0540	USA, WTJC Newport NC: Scripture Reading.
0550	USA, WTJC Newport NC: Music.

## Tuesdays

0500	USA, KTVN Salt Lk City UT: Praise the Lord (live). See S 0500.
0500	USA, WTJC Newport NC: News and Weather.
0505	USA, WTJC Newport NC: Gospel Hour.
0535	USA, WTJC Newport NC: Music.
0540	USA, WTJC Newport NC: Scripture Reading.

0550 USA. WTJC Newport NC: Music.

## Wednesdays

0500 USA, KTVB Salt Lk City UT: Dr. Mark Chironna. See W 0000.

0500 USA, WTJC Newport NC: News and Weather.

0505 USA, WTJC Newport NC: Gospel Hour.

0530 UK, BBC London (AE): R&B with DJ EE. Estelle Bingham ("Double E") spins a mix of classic R&B and new sounds, as well as celebrity interviews.

0530 USA, KTVB Salt Lk City UT: Jesse Duplantis. See T 0230.

0535 USA, WTJC Newport NC: Music.

0540 USA, WTJC Newport NC: Scripture Reading.

0550 USA, WTJC Newport NC: Music.

## Thursdays

0500 USA, KTVN Salt Lk City UT: Praise the Lord (live). See S  
0500. 0500 USA, WTJC Newport NC: News and Weather.  
0505 USA, WTJC Newport NC: Gospel Hour.  
0530 UK, BBC London (AS): R&B with DJ EE. See W 0530.  
0535 USA, WTJC Newport NC: Music.  
0540 USA, WTJC Newport NC: Scripture Reading.  
0550 USA, WTJC Newport NC: Music.

## Fridays

0500 USA, KTBN Salt Lk City UT: Carman. See S 0300.

0500 USA, WTJC Newport NC: News and Weather.  
0505 USA, WTJC Newport NC: Gospel Hour.  
0530 USA, KTBN Salt Lk City UT: Michael English. See W  
0000.  
0535 USA, WTJC Newport NC: Music.  
0540 USA, WTJC Newport NC: Scripture Reading.  
0550 USA, WTJC Newport NC: Music.

## Saturdays

0500 USA, KTVB Salt Lk City UT: Real Videos. Music videos  
with a Christian theme.

0500 USA, WTJC Newport NC: News and Weather.

0505 USA, WTJC Newport NC: Gospel Hour.

0530 USA, KTVB Salt Lk City UT: Al Denson. See W 0000.

0535 USA, WTJC Newport NC: Music.

## HAUSER'S HIGHLIGHTS

**SPAIN: REE**

Ladino weekly broadcasts:

<u>Day</u>	<u>UT</u>	<u>Target</u>	<u>kHz</u>
Mon	1825-1855	ME	17770
Tue0115-0145		SAm	11795
Tue0415-0445		NAm	9650

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## FREQUENCIES

0600-0700	Anguilla, Caribbean Beacon	6090am				0600-0700	Singapore, RCorp Singapore	6150do			
0600-0700 vl	Australia, ABC/Katherine	5025do				0600-0700 vl	Solomon Islands, SIBC	5020do			
0600-0700 vl	Australia, ABC/Tent Creek	4910do				0600-0605	Swaziland, Trans World R	4775af	9500af		
0600-0700	Australia, Radio	9660as	12080as	15240as	15415as	0600-0630	Switzerland, Swiss R Intl	9655eu			
		15515as	17580as	17750as	21725as	0600-0700	UK, BBC World Service	3955eu	6005af	6175am	6190af
0600-0700 vl	Botswana, Radio	4820do						6195eu	7160af	9410eu	9580pa
0600-0700 vl	Canada, CBC N Quebec Svc	9625do						9740as	11760me	11765af	11940af
0600-0700	Canada, CFRX Toronto	6070do						11955pa	12095eu	15310as	15360as
0600-0700	Canada, CFVP Calgary	6030do						15420af	15575as	17640af	17760as
0600-0700	Canada, CHNX Halifax	6130do						17790as	17885af	21660as	
0600-0700	Canada, CKZN St John's	6160do				0600-0700	USA, Armed Forces Network	4278am	6458am	12689am	
0600-0700	Canada, CKZU Vancouver	6160do				0600-0700	USA, KAIJ Dallas TX	5835va			
0600-0629	Canada, Radio Canada Intl	5960na	6045va	6150eu	9670na	0600-0700	USA, KTBN Salt Lk City UT	7510na			
		9780af	11905af			0600-0700	USA, KWHR Naalehu HI	17780as			
		11710af	15325af			0600-0700	USA, Voice of America	5970af	5995af	6035af	6080af
0600-0629 mtwhf	Canada, Radio Canada Intl	6975va						7170af	7295af	11805af	11825af
0600-0700	Costa Rica, RF Peace Intl	11880au	13820al					11930af	12080af	15205as	15600af
0600-0605	Croatia, Croatian Radio	9550na	9820na	9830na		0600-0700	USA, WBCQ Monticello ME	7415na			
0600-0700	Cuba, Radio Havana	9745na	12015na	21455va		0600-0700	USA, WEWN Birmingham AL	5825na			
0600-0700	Ecuador, HCJB	6140eu	7225af	9565af	11785af	0600-0700	USA, WGTG McCaysville GA	5085va	6890va		
0600-0645	Germany, Deutsche Welle	13810au				0600-0700	USA, WHRA Greenville SC	7435af			
0600-0700	Germany, Overcomer Ministr	3366do	4915do			0600-0700	USA, WHRI Noblesville IN	5745na	7315sa		
0600-0700 vl	Ghana, Ghana BC Corp	3985va				0600-0700	USA, WJCR Upton KY	7490na	13595na		
0600-0700 vl	Italy, IRRS	5975eu	7230eu	9835na	11740as	0600-0700	USA, WRMI/R Miami Intl	7385na			
0600-0700	Japan, Radio/NHK	11840as	11850pa			0600-0700	USA, WRNO New Orleans LA	7395na			
		4885do	4935do			0600-0700	USA, WSHB Cypress Crk SC	7535af			
0600-0700	Kenya, Kenya BC Corp	9810do				0600-0700	USA, WTJC Newport NC	9370na			
0600-0700	Kiribati, Radio	15110as				0600-0700	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0600-0700 vl	Kuwait, Radio	4800do				0600-0700	USA, WYFR Okeechobee FL	5985na	7355eu		
0600-0700	Lesotho, Radio	5100do				0600-0700 vl	Vanuatu, Radio	4960do			
0600-0700	Liberia, LCN/R Liberia Int	3380do	5993do			0600-0620	Vatican City, Vatican R	4005eu	5883eu	7250eu	
0600-0700 vl	Malawi, MBC	7295do				0600-0700	Yemen, Rep of Yemen Radio	9780me			
0600-0700	Malaysia, Radio	7160do				0600-0700	Zambia, Christian Voice	9865do			
0600-0700	Malaysia, RTM Sarawak	6175as	9750as	15295as		0600-0700	Zambia, Natl BC Corp	6165do	6265do		
0600-0700	Malaysia, Voice of	7165af				0600-0700 vl	Zimbabwe, Zimbabwe BC	5975do			
0600-0605	Namibia, NBC	17675va				0605-0700	Swaziland, Trans World R	4775af	6100af	9500af	
0600-0700 vl	New Zealand, R NZ Intl	6050do				0610-0615 mtwhf	Greece, Voice of	7475eu	11645au	15630eu	
0600-0700 vl	Nigeria, Radio/Ibadan	4770do				0630-0700	Austria, R Austria Intl	6015na			
0600-0700	Nigeria, Radio/Kaduna	3326do				0630-0700	Georgia, Georgian Radio	11910eu			
0600-0700	Nigeria, Voice of	7255af	15120va			0630-0700 mtwhfa	Malta, VO Mediterranean	7155eu			
0600-0700 vl	Papua New Guinea, NBC	9675do				0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7295af
0600-0700	Romania, R Romania Intl	9530na	11830na					11805af	12080af	15600af	
0600-0700	Russia, Voice of Russia WS	15460au	15470au	15525au	17570au	0630-0700	Vatican City, Vatican R	11625af	13765af	15570af	
		21790au				0641-0656	Romania, R Romania Intl	7105eu	9510eu	11775eu	15105eu
0600-0630	S Africa, Channel Africa	15215af				0645-0700	Germany, Deutsche Welle	6140eu			
0600-0700	Sierra Leone, SLBS	3316do									

## SELECTED PROGRAMS

## Sundays

- 0600 USA, KTBN Salt Lk City UT: International Intelligence Briefing. Hal Lindsey and Cliff Ford with 30 minutes of late-breaking news and commentary.
- 0600 USA, WTJC Newport NC: Sermon and Song.
- 0630 USA, KTBN Salt Lk City UT: Behind the Scenes. TBN news, letters, and reports with Paul Krause.
- 0630 USA, WTJC Newport NC: Music.

## Mondays

- 0600 USA, KTBN Salt Lk City UT: Jack Van Impe Presents. Reporting and interpreting international news in bible prophecy.
- 0600 USA, VOA Washington DC (af): Daybreak Africa. See Af 0300.
- 0600 USA, WTJC Newport NC: Sermon and song.
- 0615 USA, WTJC Newport NC: Music.
- 0630 USA, KTBN Salt Lk City UT: Changing Your World. See M 0230.
- 0630 USA, WTJC Newport NC: Golden Daybreak Hour.
- 0645 USA, WTJC Newport NC: Music.

## Tuesdays

- 0600 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1530.
- 0600 USA, VOA Washington DC (af): Daybreak Africa. See Af 0300.
- 0600 USA, WTJC Newport NC: Sermon and song.
- 0615 USA, WTJC Newport NC: Music.
- 0630 USA, KTBN Salt Lk City UT: This is Your Day! See M

- 1130.
- 0630 USA, WTJC Newport NC: Golden Daybreak Hour.
- 0645 USA, WTJC Newport NC: Music.

## Wednesdays

- 0600 USA, KTBN Salt Lk City UT: Teen Mania. See S 0430.
- 0600 USA, VOA Washington DC (af): Daybreak Africa. See Af 0300.
- 0600 USA, WTJC Newport NC: Sermon and song.
- 0615 USA, WTJC Newport NC: Music.
- 0630 USA, KTBN Salt Lk City UT: This is Your Day! See M 1130.
- 0630 USA, WTJC Newport NC: Golden Daybreak Hour.
- 0645 USA, WTJC Newport NC: Music.

## Thursdays

- 0600 USA, KTBN Salt Lk City UT: Rich & Robyn Wilkerson. See S 1300.
- 0600 USA, VOA Washington DC (af): Daybreak Africa. See Af 0300.
- 0600 USA, WTJC Newport NC: Sermon and song.
- 0615 USA, WTJC Newport NC: Music.
- 0630 USA, KTBN Salt Lk City UT: This is Your Day! See M 1130.
- 0630 USA, WTJC Newport NC: Golden Daybreak Hour.
- 0645 USA, WTJC Newport NC: Music.

## Fridays

- 0600 USA, KTBN Salt Lk City UT: Tommy Barnett and

- Matthew Barnett. See S 1300.
- 0600 USA, VOA Washington DC (af): Daybreak Africa. See Af 0300.
- 0600 USA, WTJC Newport NC: Sermon and song.
- 0615 USA, WTJC Newport NC: Music.
- 0630 USA, KTBN Salt Lk City UT: This is Your Day! See M 1130.
- 0630 USA, WTJC Newport NC: Golden Daybreak Hour.
- 0645 USA, WTJC Newport NC: Music.

## Saturdays

- 0600 USA, KTBN Salt Lk City UT: Tommy Barnett and Matthew Barnett. See S 1300.
- 0600 USA, WTJC Newport NC: Music.
- 0630 USA, KTBN Salt Lk City UT: This is Your Day! See M 1130.

## PROPAGATION FORECASTING

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248 TOWERHILL ROAD  
PETERBOROUGH, ON K9H 7N1  
CANADA

DISTRIBUTOR ASAPS PROPAGATION SOFTWARE  
E-MAIL: MONITOR@RAC.CA

## FREQUENCIES

0700-0800	Anguilla, Caribbean Beacon	6090am				0800-0900	Albania, Trans World R	9870eu	12070eu		
0700-0800 vl	Australia, ABC/Katherine	5025do				0800-0900	Anguilla, Caribbean Beacon	6090am			
0700-0800 vl	Australia, ABC/Tent Creek	4910do				0800-0830 vl	Australia, ABC/Katherine	5025do			
0700-0800	Australia, Radio	9660as	12080as	15240as	15415as	0800-0830 vl	Australia, ABC/Tent Creek	4910do			
		15515as	17580as	17750as	21725as	0800-0830	Australia, Radio	5995as	9710as	12080as	13605as
0700-0800 vl	Botswana, Radio	4820do	4830do	7255do				15515as	21725as		
0700-0800	Canada, CFRX Toronto	6070do				0800-0830 as	Australia, Radio	15415as	17750as		
0700-0800	Canada, CFVP Calgary	6030do				0800-0830	Belgium, R Vlaanderen Intl	5985am			
0700-0800	Canada, CHNX Halifax	6130do				0800-0900 vl	Botswana, Radio	4820do	4830do	7255do	
0700-0800	Canada, CKZN St John's	6160do				0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0700-0800	Canada, CKZU Vancouver	6160do				0800-0900	Canada, CFRX Toronto	6070do			
0700-0800	Costa Rica, RF Peace Intl	6975va				0800-0900	Canada, CFVP Calgary	6030do			
0700-0705	Croatia, Croatian Radio	11880au	13820al			0800-0900	Canada, CHNX Halifax	6130do			
0700-0800	Ecuador, HCJB	9780eu	11755pa	21455va		0800-0900	Canada, CKZN St John's	6160do			
0700-0800	Eqt Guinea, Radio Africa	15186af				0800-0900	Canada, CKZU Vancouver	6160do			
0700-0800	Germany, Deutsche Welle	6140eu				0800-0900	Costa Rica, RF Peace Intl	6975va			
0700-0800	Germany, Voice of Hope	5975eu				0800-0805	Croatia, Croatian Radio	13820au			
0700-0800 s	Germany, Good News World R	13740au				0800-0827	Czech Rep, R Prague Intl	11600eu	15255eu		
0700-0715 vl	Ghana, Ghana BC Corp	3366do	4915do			0800-0900	Ecuador, HCJB	9780eu	11755pa	21455va	
0700-0800 vl	Italy, IRRS	7120va				0800-0900	Eqt Guinea, Radio Africa	15186af			
0700-0800	Kenya, Kenya BC Corp	4885do	4935do			0800-0900	Germany, Deutsche Welle	6140eu			
0700-0800	Kiribati, Radio	9810do				0800-0900	Germany, Voice of Hope	5975eu			
0700-0800	Kuwait, Radio	15110as				0800-0900	Germany, Overcomer Ministr	13810au			
0700-0800 vl	Lesotho, Radio	4800do				0800-0900 vl	Ghana, Ghana BC Corp	3366do	4915do		
0700-0715	Liberia, LCN/R Liberia Intl	5100do				0800-0900 as	Guam, TWR/KTWR	15200as			
0700-0800 vl	Malawi, MBC	3380do	5995do			0800-0900	Guam, TWR/KTWR	15300au			
0700-0800	Malaysia, Radio	7295do				0800-0900	Indonesia, Voice of	9525va			
0700-0800	Malaysia, RTM Sarawak	7160do				0800-0815 vl	Italy, IRRS	7120va			
0700-0800	Malaysia, Voice of	6175as	9750as	15295as		0800-0900	Kenya, Kenya BC Corp	4885do	4935do		
0700-0800	New Zealand, R NZ Intl	17690va				0800-0900	Kiribati, Radio	9810do			
0700-0800 vl	Nigeria, Radio/Ibadan	6050do				0800-0900 vl	Lesotho, Radio	4800do			
0700-0800 vl	Nigeria, Radio/Kaduna	4770do				0800-0900	Liberia, LCN/R Liberia Intl	5100do			
0700-0800 vl	Nigeria, Voice of	7255af	15120va			0800-0810 vl	Malawi, MBC	3380do	5995do		
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as	15725as		0800-0900	Malaysia, Radio	7295do			
0700-0730 vl	Papua New Guinea, NBC	9675do				0800-0825	Malaysia, Voice of	6175as	9750as	15295as	
0700-0800	Romania, R Romania Intl	17720af	21480af			0800-0900 vl	Malaysia, RTM KotaKinabalu	5980do			
0700-0800	Russia, Voice of Russia WS	15460au	15470au	15525au	17495au	0800-0900 mtwhf	Monaco, Trans World Radio	9870eu			
		17570au	21790au			0800-0830	Myanmar, Radio	9730do			
0700-0800	Sierra Leone, SLBS	3316do				0800-0900	N Marianas, KFBS Saipan	11650as	15380as		
0700-0800	Singapore, RCorp Singapore	6150do				0800-0900	New Zealand, R NZ Intl	17690va			
0700-0730	Slovakia, R Slovakia Intl	11990au	15460au	21705au		0800-0900 vl	Nigeria, Radio/Ibadan	6050do			
0700-0800 vl	Solomon Islands, SIBC	5020do				0800-0900 vl	Nigeria, Radio/Kaduna	4770do			
0700-0705	Swaziland, Trans World R	4775af	6100af	9500af		0800-0900	Nigeria, Radio/Lagos	3326do			
0700-0800	Taiwan, Radio Taiwan Intl	5950na				0800-0900	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0700-0800	UK, BBC World Service	6005af	6175am	6190af	6195eu	0800-0900 vl	Papua New Guinea, NBC	4890do			
		9410eu	9580pa	9740as	11760me	0800-0900	Russia, Voice of Russia WS	9905au	15460au	15470au	17495au
		11765af	11940af	11955pa	12095eu			21740au			
		15310as	15400af	15485eu	15565eu	0800-0900	Sierra Leone, SLBS	5980do			
		17640eu	17760as	17790as	17830af	0800-0900	Singapore, RCorp Singapore	6150do			
		21660as				0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0700-0715 as	UK, BBC World Service	17885af				0800-0900	UK, BBC World Service	6190af	9410eu	9580pa	9740as
0700-0800	USA, Armed Forces Network	4278am	6458am	12689am				11940af	11955pa	12095eu	15310as
0700-0800	USA, KAIJ Dallas TX	5835va						15360as	15400af	15485eu	15565eu
0700-0800	USA, KTVN Salt Lk City UT	7510na						17640eu	17760as	17790as	17830af
0700-0800	USA, KWHR Naalehu HI	11565as	17780as					21660as	21830as		
0700-0730 a	USA, Voice of America	6873va				0800-0900 as	UK, BBC World Service	15575as	17885af		
0700-0800	USA, WBCQ Monticello ME	7415na				0800-0900	USA, Armed Forces Network	4278am	6458am	12689am	
0700-0800	USA, WEWN Birmingham AL	5825na				0800-0900	USA, KAIJ Dallas TX	5835va			
0700-0800	USA, WHRA Greenbush ME	7435af				0800-0900	USA, KNLS Anchor Point AK	9615as			
0700-0800	USA, WHRI Noblesville IN	5745na	7315sa			0800-0900	USA, KTVN Salt Lk City UT	7510na			
0700-0800	USA, WJCR Upton KY	7490na	13595na			0800-0900	USA, KWHR Naalehu HI	11565as	17780as		
0700-0800	USA, WRMI/R Miami Intl	7385na				0800-0900	USA, Voice of America	11995as	13650as	15150as	
0700-0800	USA, WRNO New Orleans LA	7395na				0800-0900	USA, WBCQ Monticello ME	7415na			
0700-0800	USA, WSHB Cypress Crk SC	7535af				0800-0900	USA, WEWN Birmingham AL	5825na			
0700-0800	USA, WTJC Newport NC	9370na				0800-0900	USA, WHRA Greenbush ME	7435af			
0700-0800	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	0800-0900	USA, WHRI Noblesville IN	5745na	7315sa		
0700-0800	USA, WYFR Okeechobee FL	5850eu	7355eu	9985af		0800-0900	USA, WJCR Upton KY	7490na	13595na		
0700-0800 vl	Vanuatu, Radio	4960do				0800-0900 twhfa	USA, WRMI/R Miami Intl	7385na			
0700-0800	Zambia, Christian Voice	9865do				0800-0900	USA, WRNO New Orleans LA	7395na			
0700-0800	Zambia, Natl BC Corp	6165do	6265do			0800-0900	USA, WSHB Cypress Crk SC	7535eu	9845pa		
0700-0800 vl	Zimbabwe, Zimbabwe BC	5975do				0800-0900	USA, WTJC Newport NC	9370na			
0705-0710 mtwhfa	Croatia, Croatian Radio	6165eu	7365eu	9830eu		0800-0900	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0710-0715 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			0800-0900 vl	Vanuatu, Radio	4960do			
0715-0800 as	UK, BBC World Service	15575as	17885af			0800-0900	Zambia, Christian Voice	9865do			
0725-0800	Myanmar, Radio	9730do				0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0730-0800	Finland, YLE/R Finland	9840va	21670as			0800-0900 vl	Zimbabwe, Zimbabwe BC	5975do			
0730-0750 a	Finland, YLE/R Finland	9840va	21670as			0804-0820	Pakistan, Radio	15530eu	17835eu		
0730-0800 as	Guam, TWR/KTWR	15200as				0805-0810 s	Croatia, Croatian Radio	6165eu	7185eu	7365eu	9830eu
0730-0800 vl	Papua New Guinea, NBC	4890do				0815-0900 as/vl	Italy, IRRS	7120va			
0730-0800	Switzerland, Swiss R Intl	9885va	13635af	17665af		0815-0900 vl	Seychelles, FEBA Radio	15460as			
0730-0745 mtwhf	Vatican City, Vatican R	4005eu	5883eu	6185eu	7250eu	0830-0900 vl	Australia, ABC/Alice Spgs	2310do			
		9645eu	11740eu	15595af		0830-0900 vl	Australia, ABC/Katherine	2485do			
		7425eu	7475eu	9420na	11645au	0830-0900 vl	Australia, ABC/Tent Creek	2325do			
		15630eu				0830-0900	Australia, Radio	5995as	9710as	12080as	13605as
0745-0800 as	Albania, Trans World R	9870eu	12070eu					15415as	15515as	17750as	21725as
0745-0755 as	Monaco, Trans World Radio	9870eu				0830-0900 a	Austria, R Austria Intl	21650as	21765as		
0750-0800 as	Greece, Voice of	9775au				0830-0900	Georgia, Georgian Radio	11910eu			
0755-0800 mtwhf	Albania, Trans World R	9870eu	12070eu			0830-0900 vl	Solomon Islands, SIBC	5020do			
0755-0800 mtwhf	Monaco, Trans World Radio	9870eu				0830-0900	Switzerland, Swiss R Intl	9885au	13685au		

## FREQUENCIES

0900-0000	Albania, Trans World R	9870eu	12070eu			0930-1000	Lithuania, Radio Vilnius	9710eu			
0900-1000	Anguilla,Caribbean Beacon	6090am				0930-1000	Netherlands, Radio	7260as	9790as	12065as	
0900-1000 vl	Australia, ABC/Alice Spgs	2310do				0930-1000	Philippines, FEBC R Intl	11635as			
0900-1000 vl	Australia, ABC/Katherine	2485do				0945-1000	Germany, Deutsche Welle	6140eu			
0900-1000 vl	Australia, ABC/Tent Creek	2325do				0953-1000	Australia, Def Forces R	11140as			
0900-1000	Australia, Radio	11880as	13605as	17750as	21820as	1000-1100	Anguilla,Caribbean Beacon	11775am			
0900-1000 vl	Botswana, Radio	4820do	4830do	7255do		1000-1030 s	Armenia, Voice of	4810eu	15270eu		
0900-1000	Canada, CFRX Toronto	6070do				1000-1100 vl	Australia, ABC/Alice Spgs	2310do			
0900-1000	Canada, CFVP Calgary	6030do				1000-1100 vl	Australia, ABC/Katherine	2485do			
0900-1000	Canada, CHNX Halifax	6130do				1000-1100 vl	Australia, ABC/Tent Creek	2325do			
0900-1000	Canada, CKZN St John's	6160do				1000-1100	Australia, Radio	11880as	13605as	17750as	21820as
0900-1000	Canada, CKZU Vancouver	6160do				1000-1100 as	Bhutan, Bhutan BC Service	5030do			
0900-0956	China, China Radio Intl	11730pa	15210pa			1000-1100 vl	Botswana, Radio	4820do	4830do	7255do	
0900-1000	Costa Rica,RF Peace Intl	6975va				1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
0900-0905	Croatia, Croatian Radio	13820au				1000-1100	Canada, CFRX Toronto	6070do			
0900-1000	Ecuador, HCJB	11775pa	21455va			1000-1100	Canada, CFVP Calgary	6030do			
0900-1000	Eqt Guinea, Radio Africa	15186af				1000-1100	Canada, CHNX Halifax	6130do			
0900-0945	Germany, Deutsche Welle	6140eu	6160pa	11785af	12055as	1000-1100	Canada, CKZN St John's	6160do			
		15105as	15410af	17800af	17820as	1000-1100	Canada, CKZU Vancouver	6160do			
		17860af	21600af			1000-1056	China, China Radio Intl	11730pa	15210pa		
0900-1000	Germany, Voice of Hope	5975eu				1000-1100	Costa Rica,RF Peace Intl	6975va			
0900-1000 a	Germany,Good News World R	5995eu				1000-1029	Czech Rep, R Prague Intl	17485af	21745va		
0900-1000 s	Germany,Good News World R	13800va				1000-1100	Ecuador, HCJB	11755pa	21455va		
0900-0915	Ghana, Ghana BC Corp	4915do	6130do			1000-1100	Eqt Guinea, Radio Africa	15186af			
0900-0915 as	Guam, TWR/KTWR	15200as				1000-1100	Germany, Deutsche Welle	6140eu			
0900-0930	Guam, TWR/KTWR	71300as				1000-1100	Germany, Voice of Hope	5975eu			
0900-1000 as/vl	Italy, IRRS	1520va				1000-1100	India, All India Radio	11585as	13700as	15020as	17840as
0900-1000	Kenya, Kenya BC Corp	4935do						17845au	17895au		
0900-0930	Kiribati, Radio	9810do				1000-1100 as/vl	Italy, IRRS	7120va			
0900-1000 vl	Lesotho, Radio	4800do				1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as	
0900-0915	Liberia,LCN/R Liberia Int	5100do				1000-1100	Kenya, Kenya BC Corp	4935do			
0900-1000	Malaysia, Radio	7295do				1000-1100 vl	Lesotho, Radio	4800do			
0900-1000 vl	Malaysia,RTM KotaKinabalu	5980do				1000-1100	Malaysia, Radio	7295do			
0900-1000 s	Malta, VO Mediterranean	11770eu				1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do			
0900-0920 mtwhf	Monaco, Trans World Radio	9870eu				1000-1100	N Marianas, KFBS Saipan	9495as	11650as	15380as	
0900-1000	N Marianas, KFBS Saipan	9495as	11650as	15380as		1000-1100	N Marianas, KHBI Saipan	11840as			
0900-1000	N Marianas, KHBI Saipan	11725as				1000-1100	Netherlands, Radio	7260as	9790as	12065as	
0900-1000	New Zealand, R NZ Intl	17690va				1000-1005	New Zealand, R NZ Intl	17690va			
0900-1000 vl	Nigeria, Radio/Ibadan	6050do				1000-1100 vl	Nigeria, Radio/Ibadan	6050do			
0900-1000 vl	Nigeria, Radio/Kaduna	4770do				1000-1100 vl	Nigeria, Radio/Kaduna	4770do			
0900-1000	Nigeria, Radio/Lagos	3326do				1000-1100 vl	Nigeria, Voice of	7255af	15120va		
0900-1000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as	1000-1100	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0900-1000 vl	Papua New Guinea, NBC	4890do				1000-1100 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia,Voice of Russia WS	9905au	15460au	15470au	17495au	1000-1100	Philippines, FEBC R Intl	11635as			
0900-1000	Sierra Leone, SLBS	5980do				1000-1100	Sierra Leone, SLBS	5980do			
0900-1000	Singapore,RCorp Singapore	6150do				1000-1030	Singapore, RTE Radio	11740as			
0900-1000 vl	Solomon Islands, SIBC	5020do				1000-1100	Singapore,RCorp Singapore	6150do			
0900-1000	Tanzania, Radio	5050af				1000-1100 vl	Solomon Islands, SIBC	5020do			
0900-1000	UK, BBC World Service	6190af	6195va	7245as	9740as	1000-1030	Tanzania, Radio	5050af			
		11760me	11765as	11940af	11945as	1000-1100	UK, BBC World Service	6190af	6195va	9740as	11760me
		11955pa	12095eu	15190sa	15310as			11940af	11955pa	12095eu	15310as
		15360as	15400af	15485eu	15565eu			15360as	15485eu	15565eu	15575as
		15575as	17640eu	17760as	17790as			17640eu	17760as	17790as	17885af
		17830af	17885af	21470af	21660as			21470af	21660as		
0900-1000	USA, Armed Forces Network	4278am	6458am	12689am		1000-1100 as	UK, BBC World Service	15190sa	15400af	17830af	
0900-1000	USA, KAIJ Dallas TX	5835va				1000-1100	USA, Armed Forces Network	4278am	6458am	12689am	
0900-1000	USA, KTVN Salt Lk City UT	7510na				1000-1100	USA, KAIJ Dallas TX	5835va			
0900-1000	USA, KWHR Naalehu HI	11565as				1000-1100	USA, KTVN Salt Lk City UT	7510na			
0900-1000	USA, Voice of America	11995as	13650as	15150as		1000-1100	USA, KWHR Naalehu HI	9930as	11565as		
0900-1000	USA, WBCQ Monticello ME	7415na				1000-1100	USA, Voice of America	5985pa	6165am	7370am	9590am
0900-1000	USA, WEWN Birmingham AL	5825na						11720as	15250as	15425as	
0900-1000	USA, WHRA Greenbush ME	7435af				1000-1100	USA, WBCQ Monticello ME	7415na			
0900-1000	USA, WHRI Noblesville IN	5745na	7315na			1000-1100	USA, WEWN Birmingham AL	5825na	7465eu		
0900-1000	USA, WJCR Upton KY	7490na	13595na			1000-1100	USA, WHRI Noblesville IN	6040na	9495am		
0900-1000 twhf	USA, WRMI/R Miami Intl	7385na				1000-1100	USA, WJCR Upton KY	7490na	13595na		
0900-1000	USA, WRNO New Orleans LA	7395na				1000-1100 mtwh	USA, WRMI/R Miami Intl	7385na			
0900-1000	USA, WSHB Cypress Crk SC	7535eu	9455sa	11725as		1000-1100	USA, WRNO New Orleans LA	7395na			
0900-1000	USA, WTJC Newport NC	9370na				1000-1100	USA, WSHB Cypress Crk SC	6095am	9455sa		
0900-1000	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	1000-1100	USA, WTJC Newport NC	9370na			
0900-1000	Zambia, Christian Voice	9865do				1000-1100	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0900-1000	Zambia, Natl BC Corp	6165do	6265do			1000-1100	USA, WYFR Okeechobee FL	5950na			
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do				1000-1027	Vietnam, Voice of	9840as	12020as		
0920-0950 s	Albania, Trans World R	9870eu	12070eu			1000-1100	Zambia, Christian Voice	9865do			
0920-0930 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1000-1100	Zambia, Natl BC Corp	6165do	6265do		
0920-0950 s	Monaco, Trans World Radio	9870eu				1000-1100 vl	Zimbabwe, Zimbabwe BC	5975do			
0920-0950 as	UK, BBC World Service	6195as	9740as	11955pa	15360as	1006-1058	Australia, Def Forces R	11140as			
		17760as	21660as			1030-1100 mtwhf	Ethiopia, Radio	5990do	7110do	9705do	
0930-1000	Austria, R Austria Intl	21650as	21765au			1030-1100	Guam, AWR/KSDA	11660as	11795as		
0930-1000	Georgia, Georgian Radio	11910me				1030-1100	Malaysia, RTM Sarawak	7160do			
0930-1000	Italy, AWR Europe	7230eu				1030-1100 as	Tanzania, Radio	5050af			
						1030-1100	IAF, Radio Dubai	13675eu	15370eu	15395eu	21605as

## FREQUENCIES

1100-1200	Anguilla, Caribbean Beacon	11775am				1100-1200	Switzerland, Swiss R Intl	9540as	21770as		
1100-1200 vl	Australia, ABC/Alice Spgs	2310do				1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200 vl	Australia, ABC/Katherine	2485do				1100-1200 as	Tanzania, Radio	5050af			
1100-1200 vl	Australia, ABC/Tent Creek	2325do				1100-1130 mtwhf	UK, BBC Caribbean Report	6195am	15220am		
1100-1200	Australia, Radio	5995as	6020as	9580as	12080as	1100-1200	UK, BBC World Service	5965na	6190af	6195as	9580as
		13605as	21820as					9740as	6190af	11940af	11955as
1100-1200 vl	Botswana, Radio	4820do	4830do	7255do				12095eu	15280as	15310as	15400af
1100-1200	Canada, CFRX Toronto	6070do						15485eu	15565eu	15575as	17640eu
1100-1200	Canada, CFVP Calgary	6030do						17705as	17790sa	17830af	17885af
1100-1200	Canada, CHNX Halifax	6130do						21470af			
1100-1200	Canada, CKZN St John's	6160do				1100-1130 as	UK, BBC World Service	6195na	15190sa	15220am	
1100-1200	Canada, CKZU Vancouver	6160do				1100-1200	USA, Arme Forces Network	4278am	6458am	12689am	
1100-1200	Costa Rica, RF Peace Intl	6975va				1100-1200	USA, KAJJ Dallas TX	5835va			
1100-1200	Ecuador, HCJB	12005am	15115am	21455va		1100-1200	USA, KATN Salt Lk City UT	7510na			
1100-1200	Egt Guinea, Radio Africa	15186af				1100-1200	USA, KWHR Naalehu HI	9930as	11565as		
1100-1145	Germany, Deutsche Welle	6140eu	15410af	17800af	21780af	1100-1200	USA, Voice of America	5985pa	6110as	9645as	9760as
1100-1200	Germany, Overcomer Ministr	5850eu						11705as	11720as	15250as	15425as
1100-1200 as	Ghana, Ghana BC Corp	4915do	6130do			1100-1130 mtwhf	USA, Voice of America	13675af	15510af	17650af	17750af
1100-1200	Iran, VOIRI	13710as	15255pa	15430me	17565as			21705af			
		21470as	21510as					5825na	15745eu		
1100-1200 as/vl	Italy, IRRS	7120va				1100-1200	USA, WEWN Birmingham AL	6040na	9495am		
1100-1200	Japan, Radio/NHK	6120na	9695as	15590as		1100-1200	USA, WJCR Upton KY	7490na	13595na		
1100-1200	Jordan, Radio	11690eu				1100-1200	USA, WRNO New Orleans LA	7395na			
1100-1200	Kenya, Kenya BC Corp	4935do				1100-1200	USA, WSHB Cypress Crk SC	6095am	11660sa		
1100-1110 fa	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1100-1200	USA, WTJC Newport NC	9370na			
1100-1200 vl	Lesotho, Radio	4800do				1100-1200	USA, WWCR Nashville TN	2390na	5070na	5935na	12160na
1100-1110	Liberia, LCN/R Liberia Int	5100do				1100-1200	USA, WYFR Okeechobee FL	5950na	7355na	11830na	
1100-1200	Malaysia, Radio	7295do				1100-1127	Vietnam, Voice of	7285as			
1100-1200 vl	Malaysia, RTM KotaKinabalu	5980do				1100-1200	Zambia, Christian Voice	9865do			
1100-1200	N Marianas, KFBS Saipan	9495as	11650as	15380as		1100-1200	Zambia, Natl BC Corp	6165do	6265do		
1100-1125	Netherlands, Radio	7260as	9790as	12065as		1100-1200 vl	Zimbabwe, Zimbabwe BC	5975do			
1100-1200 occsnal	New Zealand, R NZ Intl	6105va				1104-1120	Pakistan, Radio	15530eu	17835eu		
1100-1200 vl	Nigeria, Radio/Ibadan	6050do				1115-1145	Nepal, Radio	3230as	5005as		
1100-1200 vl	Nigeria, Radio/Kaduna	4770do				1130-1157	Czech Rep, R Prague Intl	11640eu	21745af		
1100-1200 vl	Nigeria, Voice of	7255af	15120va			1130-1135	Israel, Kol Israel	15640va	17535va		
1100-1104	Pakistan, Radio	7110do	11835do	15530do	17835eu	1130-1200 vl	Libya, Voice of Africa	15235va	15415va	15435va	
		21460eu				1130-1200	Netherlands, Radio	6045eu	9855eu		
1100-1200	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as	1130-1200	South Korea, R Korea Intl	9650na			
1100-1200 vl	Papua New Guinea, NBC	4890do				1130-1200 as	UK, BBC World Service	15310as	17705as		
1100-1200	Sierra Leone, SLBS	5980do				1130-1200	UK, Merlin Network One	17650au			
1100-1200	Singapore, R Singapore Int	6150as	9590as			1130-1200 f	Vatican City, Vatican R	15595af	17515af		
1100-1130 vl	Solomon Islands, SIBC	5020do				1145-1200	Germany, Deutsche Welle	6140eu			
1100-1130	Switzerland, Swiss R Intl	9535eu									

## SELECTED PROGRAMS

## Sundays

- 1100 Iran, VOIRI: Opening Prayers.  
 1100 USA, KATN Salt Lk City UT: The Winner's Way. Mac Hammond shows how to breeze through the storms of life.  
 1100 USA, WTJC Newport NC: News and Weather.  
 1105 Iran, VOIRI: News.  
 1105 USA, WTJC Newport NC: Word of Life (Spanish).  
 1120 USA, WTJC Newport NC: Music.  
 1130 Czech Rep, Radio Prague: News. See S 0100.  
 1134 Czech Rep, Radio Prague: From the Weeklies. Items and editorial opinion from the weekend Czech papers.  
 1141 Czech Rep, Radio Prague: A Letter from Prague. A recollection of an experience about Prague and the Czech people.  
 1146 Czech Rep, Radio Prague: Readings from Czech Literature. Poetry or other published works.

## Monday-Friday

- 1100 Iran, VOIRI: Opening Prayers.  
 1100 USA, KATN Salt Lk City UT: Behind the Scenes. See S 0630.  
 1100 USA, WTJC Newport NC: News and Weather.  
 1105 Iran, VOIRI: News.  
 1105 USA, WTJC Newport NC: Bible for Today.  
 1115 USA, WTJC Newport NC: Morning Devotions from the Pastor's Study.  
 1130 Czech Rep, Radio Prague: News. See S 0100.  
 1130 USA, KATN Salt Lk City UT: This is Your Day! Evangelizing and healing by Benny Hinn from the Orlando Christian Center.

## Mondays

- 1130 USA, WTJC Newport NC: Music.  
 1134 Czech Rep, Radio Prague: Current Affairs. A daily-in-

- depth look at current events in the Czech Republic.  
 1145 USA, WTJC Newport NC: Morning Devotions.  
 1146 Czech Rep, Radio Prague: One on One. Peter Smith's new interview show.

## Tuesdays

- 1130 UK, BBC London (AE): The Bitter Pill (Feb 29th, 7th, 14th). Exploring the charges that big pharmaceutical companies ignore the diseases of poor countries because of poor profits.  
 1130 USA, KATN Salt Lk City UT: This is Your Day! See M 1130.  
 1130 USA, WTJC Newport NC: Music.  
 1134 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
 1145 USA, WTJC Newport NC: Morning Devotions.  
 1145 USA, WTJC Newport NC: Music.  
 1146 Czech Rep, Radio Prague: Talking Point. Olga Szantova with a topic of concern to the Czech people.

## Wednesdays

- 1130 USA, WTJC Newport NC: Music.  
 1146 Czech Rep, Radio Prague: Ten Years After. An historical look at the Czech people and their lifestyle ten years ago.  
 1145 USA, WTJC Newport NC: Morning Devotions.  
 1145 USA, WTJC Newport NC: Music.

## Thursdays

- 1130 USA, WTJC Newport NC: Music.  
 1136 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
 1142 Czech Rep, Radio Prague: Press Review. A daily review of the Czech press.  
 1144 Czech Rep, Radio Prague: Economic Report. Czech business news, government initiatives, and sound bytes on financial matters.

- 1145 USA, WTJC Newport NC: Morning Devotions.  
 1145 USA, WTJC Newport NC: Music.  
 1149 Czech Rep, Radio Prague: I'd Like You to Meet. A studio interview with an interesting Czech personality.

## Fridays

- 1130 USA, WTJC Newport NC: Music.  
 1136 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
 1139 Czech Rep, Radio Prague: Press Review. See H 1142.  
 1142 Czech Rep, Radio Prague: Between You and Us. Information about the Czech Republic, commentary on listener letters, and occasional DX news.  
 1145 USA, WTJC Newport NC: Morning Devotions.  
 1145 USA, WTJC Newport NC: Music.

## Saturdays

- 1100 Iran, VOIRI: Opening Prayers.  
 1100 USA, KATN Salt Lk City UT: Proclaim. Former pro football player Mike Barber preaches to prison inmates.  
 1100 USA, WTJC Newport NC: News and Weather.  
 1105 Iran, VOIRI: News.  
 1105 USA, WTJC Newport NC: Grace and Truth.  
 1130 Czech Rep, Radio Prague: News. See S 0100.  
 1130 Merlin Network One: Celtic Notes (Wales Radio International).  
 1130 USA, KATN Salt Lk City UT: Flying House. A serialized cartoon program for children.  
 1135 USA, WTJC Newport NC: Music.  
 1136 Czech Rep, Radio Prague: Let's Go. Old time Czech jazz music.  
 1143 Czech Rep, Radio Prague: The Magic Carpet. See S 0113.  
 1145 USA, WTJC Newport NC: Music.



## FREQUENCIES

1200-1300	Anguilla, Caribbean Beacon	11775am				1200-1300	Sierra Leone, SLBS	5980do			
1200-1300 vl	Australia, ABC/Alice Spgs	2310do				1200-1300	Singapore, R Singapore Int	6150as	9590as		
1200-1300 vl	Australia, ABC/Katherine	2485do				1200-1300	Taiwan, Radio Taiwan Intl	7130as	9610au		
1200-1300 vl	Australia, ABC/Tent Creek	2325do				1200-1300 as	Tanzania, Radio	5050af			
1200-1300	Australia, Radio	5995as	6020as	9580as	11650as	1200-1300	UK, BBC World Service	5965na	6190af	6195va	9515na
		21820as						9580as	9740as	11760me	11940af
1200-1300 mtwhf	Bhutan, Bhutan BC Service	5030do						11955as	12095eu	15220am	15280as
1200-1300 vl	Botswana, Radio	4820do	4830do	7255do				15310as	15485af	15565eu	15575as
1200-1300	Brazil, R Nacional Bras	15445am				1200-1300	Ukraine, R Ukraine Intl	17640eu	17830af	17885af	21470af
1200-1300	Bulgaria, Radio	15700eu	17500eu			1200-1300	USA, Armed Forces Network	9870na	15520na	21510na	
1200-1215	Cambodia, Natl Radio Of	11940as				1200-1300	USA, KAJI Dallas TX	4278am	6458am	12689am	
1200-1300 vl	Canada, CBC N Quebec Svc	9625do				1200-1300	USA, KATN Salt Lk City UT	5835va			
1200-1300	Canada, CFRX Toronto	6070do				1200-1300	USA, KWHR Naalehu HI	7510na			
1200-1300	Canada, CFVP Calgary	6030do				1200-1300	USA, Voice of America	9930as	11565as		
1200-1300	Canada, CHNX Halifax	6130do						6110as	9645as	9760as	9780as
1200-1300	Canada, CKZN St John's	6160do						11705as	11715as	15425as	
1200-1300	Canada, CKZU Vancouver	6160do				1200-1300	USA, WEWN Birmingham AL	5825na	15745eu		
1200-1229	Canada, Radio Canada Intl	6150as	11730as			1200-1300	USA, WHRI Noblesville IN	6040na	9495am		
1200-1300 mtwhf	Canada, Radio Canada Intl	9640na	13650na	17710na		1200-1300	USA, WJCR Upton KY	7490na	13595na		
1200-1256	China, China Radio Intl	7265pa	9715as	11675pa	11980as	1200-1300	USA, WRNO New Orleans LA	7395na			
		15415as				1200-1300	USA, WSHB Cypress Crk SC	6095am	11660ca		
1200-1300	Costa Rica, RF Peace Intl	6975va	25930va			1200-1300	USA, WTJC Newport NC	9370na			
1200-1300	Ecuador, HCJB	12005am	15115am	21455va		1200-1300	USA, WWCN Nashville TN	5070na	5935na	7435na	12160na
1200-1300	Eqt Guinea, Radio Africa	15186af				1200-1300	USA, WYFR Okeechobee FL	5950na	7355na	11830na	11970na
1200-1300	France, Radio France Intl	11670as	15155eu	15195eu	15540af	1200-1300	Zambia, Christian Voice	9865do			
1200-1300	Germany, Deutsche Welle	6140eu				1200-1300	Zambia, Natl BC Corp	6165do	6265do		
1200-1300	Germany, Overcomer Minist	5850eu				1200-1300 vl	Zimbabwe, Zimbabwe BC	5975do			
1200-1230	Iran, VOIRI	13710as	15255pa	15430me	17565as	1204-1216 as	UK, BBC World Service	6195na	15220am		
		21510as				1204-1216 mtwhf	UK, BBC Caribbean Report	6195am	15220am		
1200-1300 as/vl	Italy, IRRS	7120va				1215-1245	Albania, R Tirana Intl	7130eu	9540eu		
1200-1300	Jordan, Radio	11690eu				1215-1300	Egypt, Radio Cairo	17595as			
1200-1220 fa	Kazakhstan, R Almaty	9620eu	11840as			1220-1220 w	Kazakhstan, R Almaty	9620eu	11840eu		
1200-1300	Kenya, Kenya BC Corp	4935do				1200-1300 mtwhf	Vatican City, Vatican R	5883va	9645va	11740va	15595va
1200-1215 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1230-1300	Bangladesh, Bangla Betar	7185as	9548as		
1200-1300 vl	Lesotho, Radio	4800do				1230-1300	Belgium, R Vlaanderen Intl	9925eu			
1200-1300	Malaysia, Radio	7295do				1230-1257	Czech Rep, R Prague Intl	6055eu	21745au		
1200-1300 vl	Malaysia, RTM Kota Kinabalu	5980do				1230-1300	Germany, AWR Europe	7230va			
1200-1230	Mongolia, Voice of	12085au				1230-1300	Guam, AWR/KSDA	15225as			
1200-1300	N Marianas, KFBS Saipan	11650as	15380as			1230-1300	Italy, AWR Europe	7230eu			
1200-1300	Netherlands, Radio	6045eu	9855eu			1230-1300	South Korea, R Korea Intl	9570as	9640om		
1200-1300 occsnal	New Zealand, R NZ Intl	6105va				1230-1300	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as
1200-1300 vl	Nigeria, Radio/Ibadan	6050do						15425as			
1200-1300 vl	Nigeria, Radio/Kaduna	4770do				1230-1300	Sweden, Radio	18960na	21810am		
1200-1256	North Korea, R Pyongyang	3560af	9640va	9850va	9975af	1230-1300	Thailand, Radio	9655as	9810as	11905as	
		11335va	13650va			1230-1257	Vietnam, Voice of	9840as	12020as		
1200-1300	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as	1240-1300 t	Kazakhstan, R Almaty	9620eu	11840eu		
1200-1300 m-a/vl	Papua New Guinea, NBC	4890do									

## SELECTED PROGRAMS

## Sundays

1200	USA, KATN Salt Lk City UT: Breakthrough. Rod Parsley conducts services from the World Harvest Church in Columbus, OH.	1246	Czech Rep, Radio Prague: One on One. See M 1146.
1200	USA, WTJC Newport NC: News and Weather.	1250	Belgium, R Vlaanderen Intl: Soundbox. See M 0425.
1205	USA, WTJC Newport NC: Dr. J. B. Buffington.		
1230	Belgium, R Vlaanderen Intl: Brussels Calling. See S 0400.		
1230	Czech Rep, Radio Prague: News. See S 0100.		
1234	Belgium, R Vlaanderen Intl: Radio World. Updates to international broadcasting schedules.		
1234	Czech Rep, Radio Prague: From the Weeklies. See S 1134.		
1240	Greece, Voice of: News. See S 0140.		
1241	Czech Rep, Radio Prague: A Letter from Prague. See S 1141.		
1246	Czech Rep, Radio Prague: Readings from Czech Literature. See S 1146.		
1247	Belgium, R Vlaanderen Intl: Brussels 1043. Listener letters are read and answered in this mailbox program.		

## Monday-Friday

1200	USA, WTJC Newport NC: News and Weather.
1205	USA, WTJC Newport NC: Facing Tomorrow.
1220	USA, WTJC Newport NC: Music.
1230	USA, WTJC Newport NC: Calvary Hour/Wingard.
1230	Belgium, R Vlaanderen Intl: Brussels Calling. See S 0400.
1230	Czech Rep, Radio Prague: News. See S 0100.
1240	Greece, Voice of: News. See S 0140.
1240	USA, WTJC Newport NC: Music.
1250	USA, WTJC Newport NC: Legal Alert.

## Mondays

1200	USA, KATN Salt Lk City UT: TotalFit. Lee Haney.
1230	USA, KATN Candi Staton Sussewell. See S 1300.
1234	Czech Rep, Radio Prague: Current Affairs. See M 1134.
1236	Belgium, R Vlaanderen Intl: Press Review. Stories on the front pages of the day's papers.
1240	Belgium, R Vlaanderen Intl: Focus on Europe. A report on happenings in the European Economic Community (EEC).
1246	Belgium, R Vlaanderen Intl: Sports Report. A roundup of the results of seasonal sports activities.

## Tuesdays

1200	USA, KATN Salt Lk City UT: Dean and Mary. Dean and Mary Brown with music that ministers.
1230	USA, KATN Salt Lk City UT: Reasons to Believe. Astronomer/minister Hugh Ross provides scientific, historical and philosophical evidence for religious skeptics.
1234	Czech Rep, Radio Prague: Current Affairs. See M 1134.
1235	Belgium, R Vlaanderen Intl: Belgium Today. Current affairs
1240	Belgium, R Vlaanderen Intl: Press Review. See M 1236.
1245	Belgium, R Vlaanderen Intl: Focus on Europe. See M 1240.
1246	Czech Rep, Radio Prague: Talking Point. See T 1146.
1250	Belgium, R Vlaanderen Intl: Sports Report. See M 1246.
1255	Belgium, R Vlaanderen Intl: Music. Popular music wraps up this edition of the broadcast.

## Wednesdays

1200	USA, KATN Salt Lk City UT: Jubilee TV. Pastor Dick Bernal from the Jubilee Christian Center in San Jose, California.
1230	Czech Rep, Radio Prague: News. See S 0100.
1230	USA, KATN Salt Lk City UT: Back on Course. Patti and Gavin MacLeod talk about marriage.
1234	Czech Rep, Radio Prague: Current Affairs. See M 1134.
1235	Belgium, R Vlaanderen Intl: Press Review. See M 1236.
1245	Belgium, R Vlaanderen Intl: Belgium Today. See T 1235.
1246	Belgium, R Vlaanderen Intl: Living in Belgium. Belgian lifestyles and activities.
1246	Czech Rep, Radio Prague: Ten Years After. See W 1116.
1250	Belgium, R Vlaanderen Intl: Green Society. See W 0415.

## Thursdays

1200	USA, KATN Salt Lk City UT: Good News Today! T.L. Osborn evangelizes.
1230	USA, KATN Salt Lk City UT: The Laverne Tripp Family. Country Christian music. Laverne and Edith Tripp and their kin.
1235	Belgium, R Vlaanderen Intl: Belgium Today. See T 1235.

1236	Czech Rep, Radio Prague: Current Affairs. See M 1134.
1239	Belgium, R Vlaanderen Intl: Press Review. See M 1236.
1242	Czech Rep, Radio Prague: Press Review. See H 1142.
1244	Belgium, R Vlaanderen Intl: The Arts. Cultural events
1244	Czech Rep, Radio Prague: Economic Report. See H 1144.
1249	Czech Rep, Radio Prague: I'd Like You to Meet. See H 1149.
1250	Belgium, R Vlaanderen Intl: Around Town. Current happenings in Brussels and other centers of culture.
1255	Belgium, R Vlaanderen Intl: Music. See T 1255.

## Fridays

1200	USA, KATN Salt Lk City UT: TotalFit. See M 1200.
1230	USA, KATN Salt Lk City UT: Doctor to Doctor. See T 0000.
1235	Belgium, R Vlaanderen Intl: Belgium Today. See T 1235.
1236	Czech Rep, Radio Prague: Current Affairs. See M 1134.
1239	Belgium, R Vlaanderen Intl: Press Review. See M 1236.
1239	Czech Rep, Radio Prague: Press Review. See H 1142.
1242	Czech Rep, Radio Prague: Between You and Us. See F 1112.
1244	Belgium, R Vlaanderen Intl: Green Society. See W 0415.
1249	Belgium, R Vlaanderen Intl: International Report. A background report on current affairs
1255	Belgium, R Vlaanderen Intl: Music. See T 1255.

## Saturdays

1200	USA, KATN Salt Lk City UT: Superbook. Animated stories from the bible for children.
1200	USA, WTJC Newport NC: News and Weather.
1205	USA, WTJC Newport NC: Happy Time.
1230	Belgium, R Vlaanderen Intl: Brussels Calling. See S 0400.
1230	Czech Rep, Radio Prague: News. See S 0100.
1230	USA, KATN Salt Lk City UT: Colby's Clubhouse. A program by kids and for kids.
1234	Belgium, R Vlaanderen Intl: Press Review. See M 1236.
1235	USA, WTJC Newport NC: Music.
1236	Czech Rep, Radio Prague: Let's Go. See A 1136.
1239	Belgium, R Vlaanderen: Music from Flanders. See S 0401.
1240	Greece, Voice of: News. See S 0140.
1243	Czech Rep, Radio Prague: The Magic Carpet. See S 0113.



## SELECTED PROGRAMS

## Sundays

Sundays		Wednesdays		Fridays	
		1305	USA, WTJC Newport NC: Prophecy for Today.	1330.	
		1320	USA, WTJC Newport NC: Music.	1330	USA, WTJC Newport NC: Word of Truth.
1300	USA, KNLS Anchor Point AK: Music/News/ Commentary.	1330	USA, KTBN Salt Lk City UT: Life in the Word. See M 1330.	1345	USA, WTJC Newport NC: Music.
1300	USA, KTBN Salt Lk City UT: Pastor Walter Hallum. No information available.	1330	USA, WTJC Newport NC: Word of Truth.		
1300	USA, WTJC Newport NC: News.	1345	USA, WTJC Newport NC: Music.		
1330	USA, KTBN Salt Lk City UT: Dr. James Merritt. New Program.			1300	USA, KNLS Anchor Point AK: Music/News/ Commentary.

## Mondays

Mondays		Thursdays		Saturdays	
1300	USA, KNLS Anchor Point AK: Music/News/Commentary.	1300	USA, KNLS Anchor Point AK: Music/News/Commentary.	1300	USA, KTNB Salt Lk City UT: Let's Have Church.
1300	USA, KTNB Salt Lk City UT: Richard and Robin Wilkerson. See S 1300.	1300	USA, WTJC Newport NC: News and Weather.	1300	USA, WTJC Newport NC: News and Weather.
1300	USA, WTJC Newport NC: News and Weather.	1300	USA, WTJC Newport NC: News and Weather.	1305	USA, WTJC Newport NC: Prophecy for Today.
1305	USA, WTJC Newport NC: Prophecy for Today.	1305	USA, WTJC Newport NC: Prophecy for Today.	1320	USA, WTJC Newport NC: Music.
1320	USA, WTJC Newport NC: Music.	1320	USA, WTJC Newport NC: Music.	1330	USA, KTNB Salt Lk City UT: Life in the Word. See M 1330.
1330	USA, KTNB Salt Lk City UT: Life in the Word. Joyce Meyer.	1330	USA, KTNB Salt Lk City UT: Life in the Word. See M 1330.	1330	USA, WTJC Newport NC: Word of Truth.
1330	USA, WTJC Newport NC: Word of Truth.	1330	USA, WTJC Newport NC: Word of Truth.	1345	USA, WTJC Newport NC: Music.
1345	USA, WTJC Newport NC: Music.	1345	USA, WTJC Newport NC: Music.		

## Tuesdays

Tuesdays		1300	USA, KNLS Anchor Point AK: Music/News/	1300	USA, KTNB Salt Lk City UT: Kids Against Crime.
1300	USA, KNLS Anchor Point AK: Music/News/	1300	Commentary.	1300	Talk about programs making a difference in the lives of youth.
1300	USA, KTNB Salt Lk City UT: By the Way, Del & Cindy Way host this music program from Dallas.	1300	USA, KTNB Salt Lk City UT: Our Town. See S 1300.	1300	USA, WTJC Newport NC: News and Weather.
1300	USA, WTJC Newport NC: News and Weather.	1300	USA, WTJC Newport NC: News and Weather.	1305	USA, WTJC Newport NC: Calvary Hour.
		1305	USA, WTJC Newport NC: Prophecy for Today.	1335	USA, WTJC Newport NC: Music.
		1320	USA, WTJC Newport NC: Music.		
		1330	USA, KTNB Salt Lk City UT: Life in the Word. See M		

## Fridays

1300 USA, KNLS Anchor Point AK: Music/News/  
Commentary.

1300 USA, KTBN Salt Lk City UT: Let's Have Church.  
Mike Purkey conducts the services.

1300 USA, WTJC Newport NC: News and Weather.

1305 USA, WTJC Newport NC: Prophecy for Today.

1320 USA, WTJC Newport NC: Music.

1330 USA, KTBN Salt Lk City UT: Life in the Word. See M  
1330.

1330 USA, WTJC Newport NC: Word of Truth.

1345 USA, WTJC Newport NC: Music.

## Saturdays

1300	USA, KNLS Anchor Point AK: Music/News/ Commentary.
1300	USA, KTVN Salt Lk City UT: Kids Against Crime. Talk about programs making a difference in the lives of youth.
1300	USA, WTJC Newport NC: News and Weather.
1305	USA, WTJC Newport NC: Calvary Hour.
1335	USA, WTJC Newport NC: Music.

## FREQUENCIES

1400-1500	Anguilla, Caribbean Beacon	11775am				1400-1500	Switzerland, Swiss R Intl	12010as	15185as		
1400-1500 vl	Australia, ABC/Alice Spgs	2310do				1400-1500	Taiwan, Radio Taiwan Intl	15125as			
1400-1500 vl	Australia, ABC/Katherine	2485do				1400-1500 as	Tanzania, Radio	5050af			
1400-1500 vl	Australia, ABC/Tent Creek	2325do				1400-1430	Thailand, Radio	9530as	9655as	11905as	
1400-1500	Australia, Radio	5995as	6180as	9445as	9550as	1400-1430	Turkey, Voice of	15295as	17815eu		
		9580as	11650as	11660as		1400-1500	Uganda, Radio	4976do			
		4830do	7255do			1400-1500	UK, BBC World Service	5990as	6190af	6195as	9515na
1400-1500 vl	Botswana, Radio	4820do						9590na	9740as	11940af	12095eu
1400-1500 vl	Canada, CBC N Quebec Svc	9625do						15220na	15310as	15485eu	15565eu
1400-1500	Canada, CFRX Toronto	6070do						15575as	17630as	17640eu	17830af
1400-1500	Canada, CFVP Calgary	6030do						17840am	21470af	21660af	
1400-1500	Canada, CHNX Halifax	6130do				1400-1500 a	UK, Merlin Network One	9605eu	13640eu	15510eu	
1400-1500	Canada, CKZN St John's	6160do				1400-1500	USA, Armed Forces Network	4278am	6458am	12689am	
1400-1500	Canada, CKZU Vancouver	6160do				1400-1500	USA, KAIJ Dallas TX	13815va			
1400-1500	Canada, Radio Canada Intl	9640na	17710na			1400-1500	USA, KJES Vado NM	11715na			
1400-1500 smtwhf	Canada, Radio Canada Intl	13650na				1400-1500	USA, KTVN Salt Lk City UT	7510na			
1400-1430 mtwhf	China, China Radio Intl	7405as	9700as	11675as	11825as	1400-1500	USA, KWHR Naalehu HI	9930as	11565as		
1400-1456		13685af	15110as	15125af	15360af	1400-1500	USA, Voice of America	6110as	7125as	7215as	9645as
								9760as	11705as	15205as	15395as
								15425as	21840as		
1400-1500	Costa Rica, RF Peace Intl	25930va				1400-1430 s	USA, Voice of America	18275va			
1400-1429	Czech Rep, R Prague Intl	21745va				1400-1500	USA, WEWN Birmingham AL	11875na	15745eu		
1400-1500	Ecuador, HCJB	12005am	15115am	21455va		1400-1500 mtwhf	USA, WGTG McCaysville GA	9400va	12172am		
1400-1500	Eq Guinea, Radio Africa	15186af				1400-1500	USA, WHRI Noblesville IN	6040na	15105am		
1400-1500	France, Radio France Intl	11610as	17620va	17680as		1400-1500	USA, WJCR Upton KY	7490na	13595na		
1400-1500	Germany, RTE Radio	15625eu				1400-1500 irreg	USA, WMLK Bethel PA	9465am			
1400-1430 s	Germany, Universal Life	9710eu				1400-1500 s	USA, WRMI/R Miami Intl	9955am			
1400-1500	Germany, Voice of Hope	15715as				1400-1500	USA, WRNO New Orleans LA	7395na			
1400-1500	Germany, Overcomer Ministr	5850eu	13810eu			1400-1500	USA, WTJC Newport NC	9370na			
1400-1500	Ghana, Ghana BC Corp	4915do	6130do			1400-1500	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400-1500	India, All India Radio	9545as	11620as	13710as		1400-1500	USA, WYFR Okeechobee FL	11550as	11740na	11830na	17760na
1400-1500	Japan, Radio/NHK	9505na	11730as	11880me		1400-1405	Vatican City, Vatican R	15500au	17515au		
1400-1500	Jordan, Radio	11690eu				1400-1500	Zambia, Christian Voice	9865do			
1400-1500	Kenya, Kenya BC Corp	4935do				1400-1500	Zambia, Natl BC Corp	6165do	6265do		
1400-1500	Lebanon, Voice of Hope	11530va				1400-1500 vl	Zimbabwe, Zimbabwe BC	5975do			
1400-1500 vl	Lesotho, Radio	4800do				1410-1420 as	Greece, Voice of	9425eu	15630eu		
1400-1500	Malaysia, Radio	7295do				1415-1420	Nepal, Radio	3230as	5005as		
1400-1500	Malaysia, RTM Sarawak	7160do				1400-1500	Canada, Radio Canada Intl	11980va	17820af		
1400-1500 vl	Malaysia, RTM KotaKinabalu	5980do				1400-1500 mtwhf	Canada, Radio Canada Intl	9640na	13650na	17710na	
1400-1500	N Marianas, KFBS Saipan	9465as	9495as	9670as		1430-1500 s	Canada, Radio Canada Intl	13655na			
1400-1500 occsnal	New Zealand, R NZ Intl	6105va				1430-1440 mtwhf	Greece, Voice of	9425eu	15630am		
1400-1500 vl	Nigeria, Radio/Ibadan	6050do				1430-1500	Guam, AWR/KSDA	9835as			
1400-1500 vl	Nigeria, Radio/Kaduna	4770do				1430-1500	Guam, TWR/KTWR	15330as			
1400-1500	Oman, Radio Sultanate of	15140eu				1430-1500	Myanmar, Radio	5985do			
1400-1415	Pakistan, Radio	11570me	15170me	15465me		1430-1500	Netherlands, Radio	12070as	12090as	15590as	
1400-1500	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as	1430-1500	S Africa, RTE Radio	21745af			
1400-1500 vl	Papua New Guinea, NBC	4890do				1430-1500	Sweden, Radio	13800va	18960na	21810am	
1400-1500	Philippines, FEBC R Intl	11995as									
1400-1455 as	S Africa, Channel Africa	11720af	17780af	21530af							
1400-1500	Sierra Leone, SLBS	5980do									
1400-1500	Singapore, RCorp Singapore	6150do									
1400-1500	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as						
		15425as									

## SELECTED PROGRAMS

## Sundays

- 1400 Czech Rep, Radio Prague: News. See S 0100.  
1400 USA, KTVN Salt Lk City UT: Spiritual Protocol. Pastor Earl Paulk preaches from Atlanta.  
1400 USA, WTJC Newport NC: News and Weather.  
1404 Czech Rep, Radio Prague: From the Weeklies. See S 1134.  
1405 USA, WTJC Newport NC: Gospel Hour.  
1410 Greece, Voice of: News. See S 0140.  
1411 Czech Rep, Radio Prague: A Letter from Prague. See S 1141.  
1416 Czech Rep, Radio Prague: Readings from Czech Literature. See S 1146.  
1435 USA, WTJC Newport NC: Music.

## Monday-Friday

- 1400 Czech Rep, Radio Prague: News. See S 0100.  
1400 USA, KTVN Salt Lk City UT: Changing Your World. See M 0230.  
1400 USA, WTJC Newport NC: News and Weather.  
1404 Czech Rep, Radio Prague: Current Affairs. See M 1134.  
1405 USA, WTJC Newport NC: Gospel Hour.  
1410 Greece, Voice of: News. See S 0140.  
1430 USA, KTVN Salt Lk City UT: John Hagee Today. Evangelizing by John Hagee of the Cornerstone

- Church in San Antonio, TX.  
1435 USA, WTJC Newport NC: Music.

## Mondays

- 1416 Czech Rep, Radio Prague: One on One. See M 1146.  
1426 Czech Rep, Radio Prague: Music. Popular music or jazz fills out the remainder of the program.  
1430 UK, BBC London (AS): The Bitter Pill (Feb 26th, 6th, 13th). See T 1130.

## Tuesdays

- 1405 UK, BBC London (AF): The Bitter Pill (29th). See T 1130.  
1414 Czech Rep, Radio Prague: Talking Point. See T 1146.  
1430 UK, BBC London (AF): The Bitter Pill (2nd, 9th, 16th). See T 1130.

## Wednesdays

- 1416 Czech Rep, Radio Prague: Ten Years After. See W 1116.  
1426 Czech Rep, Radio Prague: Music. See M 1426.

## Thursdays

- 1416 Czech Rep, Radio Prague: Economic Report. See H 1144.

- 1425 Czech Rep, Radio Prague: Music. See M 1426.

## Fridays

- 1418 Czech Rep, Radio Prague: Mailbox. See F 0118.  
1425 Czech Rep, Radio Prague: Music. See M 1426.

## Saturdays

- 1400 Czech Rep, Radio Prague: News. See S 0100.  
1400 Merlin Network One: Global Sound Kitchen.  
1400 USA, KTVN Salt Lk City UT: Joy Junction. Fun and games for children from the Christian Television Network (CTN).  
1400 USA, WTJC Newport NC: News and Weather.  
1405 USA, WTJC Newport NC: Gospel Hour.  
1406 Czech Rep, Radio Prague: Let's Go. See A 1136.  
1410 Greece, Voice of: News. See S 0140.  
1413 Czech Rep, Radio Prague: The Arts. A particular topic concerning Czech art followed by focus on a Czech author.  
1430 USA, KTVN Salt Lk City UT: Quigley's Village. Mr. Quigley and his puppet friends offer wholesome entertainment for children.  
1435 USA, WTJC Newport NC: Children's Bible Club.  
1450 USA, WTJC Newport NC: Music.



1500-1600	Anguilla,Caribbean Beacon	11775am					1500-1600	Russia,Voice of Russia WS	7260me	9800as	9875as	11500as
1500-1600 vl	Australia, ABC/Alice Spgs	2310do							11695as			
1500-1600 vl	Australia, ABC/Katherine	2485do					1500-1530	S Africa, Channel Africa	11770af			
1500-1600 vl	Australia, ABC/Tent Creek	2325do					1500-1600	Seychelles, FEBA Radio	11600as			
1500-1600	Australia, Radio	5995as	6180as	9580as	11650as		1500-1600	Sierra Leone, SLBS	5980do			
		11660as					1500-1600	Singapore,RCorp Singapore	6150do			
1500-1600 vl	Botswana, Radio	4820do	4830do	7255do			1500-1600	Sri Lanka, Sri Lanka BC	4940do	6005as	6075as	9735as
1500-1600 vl	Canada, CBC N Quebec Svc	9625do							15425as			
1500-1600	Canada, CFRX Toronto	6070do					1500-1600 as	Tanzania, Radio	5050af			
1500-1600	Canada, CFVP Calgary	6030do					1500-1600	Uganda, Radio	4976do			
1500-1600	Canada, CHNX Halifax	6130do					1500-1600	UK, BBC World Service	5975as	5990as	6190af	6195as
1500-1600	Canada, CKZN St John's	6160do							9410eu	9515na	9590na	9740as
1500-1600	Canada, CKZU Vancouver	6160do							11860af	12095eu	15220na	15310as
1500-1600	Canada, Radio Canada Intl	6185as							15400af	15420af	15485eu	15565eu
1500-1600 s	Canada, Radio Canada Intl	9640na	13655na	17710na					17630as	17830af	17840am	21470af
1500-1556	China, China Radio Intl	7160as	7405as	9785as	13685af				21490af			
		15125af					1500-1600 a	UK, Merlin Network One	9605eu	13640eu	15510eu	
1500-1600	Costa Rica,RF Peace Intl	25930va					1500-1600	USA, Armed Forces Network	4278am	6458am	12689am	
1500-1600	Ecuador, HCJB	12005am	15115am	21455va			1500-1600	USA, KAIJ Dallas TX	13815na			
1500-1600	Eq't Guinea, Radio Africa	15186af					1500-1600	USA, KJES Vado NM	11715na			
1500-1600	Germany, Voice of Hope	15715as					1500-1600	USA, KTVB Salt Lk City UT	7510na			
1500-1600	Germany,Overcomer Ministr	5850eu	13810eu				1500-1600	USA, KWHR Naalehu HI	9930as			
1500-1600	Guam, TWR/KTWR	15330as					1500-1600	USA, VOA Special English	6110as	9760as	9845as	12040as
1500-1530	Israel, Kol Israel	15650va	17535va						15460as			
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as		1500-1600	USA, Voice of America	7125as	9575as	15205as	15340as
1500-1600	Jordan, Radio	11690eu					1500-1600	USA, WEWN Birmingham AL	11875na	15745eu		
1500-1600	Kenya, Kenya BC Corp	4935do					1500-1600 mtwhfa	USA, WGTG McCalysville GA	9400va	12172am		
1500-1600	Lebanon, Voice of Hope	11530va					1500-1600	USA, WHRI Noblesville IN	6040as	15105na		
1500-1600 vl	Lesotho, Radio	4800do					1500-1600	USA, WJCR Upton KY	7490na	13595na		
1500-1510	Liberia,LCN/R Liberia Int	5100do					1500-1600 irreg	USA, WMLK Bethel PA	9465am			
1500-1600	Malaysia, Radio	7295do					1500-1600	USA, WRNO New Orleans LA	7395na			
1500-1600	Malaysia, RTM Sarawak	7160do					1500-1600	USA, WTJC Newport NC	9370na			
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do					1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500-1530	Mexico, Radio Mexico Intl	9705am					1500-1600	USA, WYFR Okeechobee FL	11830na	17760na		
1500-1600	N Marianas, KFBS Saipan	9465as	9495as	9670as			1500-1600	Zambia, Christian Voice	9865do			
1500-1600	Netherlands, Radio	12070as	12090as	15590as			1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1505 occsnal	New Zealand, R NZ Intl	6105va					1500-1600 vl	Zimbabwe, Zimbabwe BC	5975do			
1500-1505 occsnal	New Zealand, R NZ Intl	6105va					1505-1600 occsnal	New Zealand, R NZ Intl	6145va			
1500-1600 vl	Nigeria, Radio/Ibadan	6050do					1515-1600 vl	Malawi, MBC	3380do			
1500-1600 vl	Nigeria, Radio/Kaduna	4770do					1530-1540	Bangladesh, Bangla Betar	4880as	15520as		
1500-1600 vl	Nigeria, Voice of	7255af	15120va				1530-1600	Iran, VOIRI	7250as	11680as	13605as	15150as
1500-1556	North Korea, R Pyongyang	4405va	6574na	9335na	11710na		1530-1600	Mongolia, Voice of	9720as	12085as		
		13760na					1545-1600 sh	Bangladesh, Bangla Betar	4880as	15520as		
1500-1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as		1550-1600	Vatican City, Vatican R	9865au	13765au	15500au	
1500-1600 vl	Papua New Guinea, NBC	4890do										

## SELECTED PROGRAMS

1500 USA, WTJC Newport NC: Sounds of Joy.  
1530 Iran, VOIRI: Opening Prayers.  
1530 USA, KTBN Salt Lk City UT: Winning Walk. Ed Young  
sermones from the Second Baptist Church of  
Houston, Texas.  
1530 USA, WTJC Newport NC: Music.  
1535 Iran, VOIRI: News.

1500 USA, KTBN Salt Lk City UT: Breakthrough. See S  
1200.

1500 USA, WTJC Newport NC: Sermon and Song.

1515 USA, WTJC Newport NC: Music.

1530 Iran, VOIR: Opening Prayers.

1530 USA, KTBN Salt Lk City UT: Today with Marilyn.  
Marilyn Hickey teaches.

1530 USA, WTJC Newport NC: Family Altar.

1535 Iran, VOIR: News.

1545 USA, WTJC Newport NC: Music.

1500 USA, KTBN Salt Lk City UT: Breakthrough. See S  
1200.

1500 USA, WTJC Newport NC: Sermon and Song.

1515 USA, WTJC Newport NC: Music.

1530 Iran, VOIRI: Opening Prayers.

1530 USA, KTBN Salt Lk City UT: Today with Marilyn. See  
M 1530.

1530 USA, WTJC Newport NC: Family Altar.

1535 Iran, VOIRI: News.

1545 USA, WTJC Newport NC: Music.

1500 USA, KTBN Salt Lk City UT: Breakthrough. See S 1200.  
1500 USA, WTJC Newport NC: Sermon and Song.  
1515 USA, WTJC Newport NC: Music.  
1530 Iran, VOIRI: Opening Prayers.  
1530 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1530.  
1530 USA, WTJC Newport NC: Family Altar.  
1535 Iran, VOIRI: News.  
1545 USA, WTJC Newport NC: Music.

1500 USA, KTBN Salt Lk City UT: Breakthrough. See S 1200.  
1500 USA, WTJC Newport NC: Sermon and Song.  
1515 USA, WTJC Newport NC: Music.  
1530 Iran, VOIRI: Opening Prayers.  
1530 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1530.  
1530 USA, WTJC Newport NC: Family Altar.  
1535 Iran, VOIRI: News.  
1545 USA, WTJC Newport NC: Music.

1500 USA, KTBN Salt Lk City UT: Breakthrough. See S 1200.  
1500 USA, WTJC Newport NC: Sermon and Song.  
1515 USA, WTJC Newport NC: Music.  
1530 Iran, VOIRI: Opening Prayers.  
1530 UK, BBC London (AE): The Bitter Pill (3rd,10th,17th).  
See T 1130.  
1530 USA, KTBN Salt Lk City UT: Today with Marilyn. See M 1530.  
1530 USA, WTJC Newport NC: Family Altar.  
1535 Iran, VOIRI: News.

1500 Merlin Network One: Global Sound Kitchen.  
1500 USA, KTBN Salt Lk City UT: Gospel Bill. Kids  
program.  
1500 USA, WTJC Newport NC: News and Weather.  
1505 USA, WTJC Newport NC: Aunt "B".  
1530 Iran, VOIR: Opening Prayers.  
1530 USA, KTBN Salt Lk City UT: Janice's Attic. Janice  
Smith finds items in her attic to entertain and teach  
children.  
1535 Iran, VOIR: News.  
1535 USA, WTJC Newport NC: Patch the Pirate.  
1550 USA, WTJC Newport NC: Music.

Global Sound Kitchen:	1756-1200	1756-1800
Fri	2200-2300	6170 7165 9615
Fri	2300-2359	3985 6170 7165
Sat	0000-0200	3985 6180 7165
Sat	1400-1600	9605 13640 15510
Sat	1600-1800	3965 9655 13640

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## FREQUENCIES

1600-1700	Algeria, R Algiers Intl	11715af	15160me	1600-1630	S Africa, Channel Africa	9525af		
1600-1700	Anguilla, Caribbean Beacon	11775am		1600-1700	Sierra Leone, SLBS	5980do		
1600-1700 vl	Australia, ABC/Alice Spgs	2310do		1600-1700	South Korea, R Korea Intl	5975om	9515af	9870af
1600-1700 vl	Australia, ABC/Katherine	2485do		1600-1700	Swaziland, Trans World R	9500af		
1600-1700 vl	Australia, ABC/Tent Creek	2325do		1600-1615	Switzerland, Swiss R Intl	12010as	15185as	
1600-1700	Australia, Radio	5995as	6180as 9500as 9580as	1600-1700	Tanzania, Radio	5050af		
		11650as	11660as	1600-1640	UAE, Radio Dubai	13630eu	13675eu	15395eu 21605eu
1600-1630	Austria, R Austria Intl	17865na		1600-1700	Uganda, Radio	4976do		
1600-1700 vl	Botswana, Radio	4820do	4830do 7255do	1600-1700	UK, BBC World Service	3195as	5975as	5990as 6190af
1600-1700 vl	Canada, CBC N Quebec Svc	9625do				6195as	7160as	9410eu 9515na
1600-1700	Canada, CFRX Toronto	6070do				9740as	11940af	12095eu 15240af
1600-1700	Canada, CFVP Calgary	6030do				15310as	15400af	15545eu 15565eu
1600-1700	Canada, CHNX Halifax	6130do				17630as	17830af	17840am 21470af
1600-1700	Canada, CKZN St John's	6160do				21660af		
1600-1700	Canada, CKZU Vancouver	6160do		1600-1700 a	UK, Merlin Network One	3965eu	9655eu	
1600-1659 s	Canada, Radio Canada Intl	9640na	13655na 17710na	1600-1700	UK, Merlin Network One	3965eu	9655eu	
1600-1656	China, China Radio Intl	9565af	9870af	1600-1700	UK, Merlin Network One	9655eu		
1600-1700	Costa Rica, RF Peace Intl	25930va		1600-1700	USA, Armed Forces Network	4278am	6458am	12689am
1600-1630	Ecuador, HCJB	12005am	15115am 21455va	1600-1700	USA, KAJJ Dallas TX	13815va		
1600-1700	Eqt Guinea, Radio Africa	15186af		1600-1700	USA, KJES Vado NM	11715na		
1600-1700	Ethiopia, Radio	7165af	9560af 11800af	1600-1700	USA, KTBN Salt Lk City UT	15590na		
1600-1700	France, Radio France Intl	11615af	11995af 12015af 15210af	1600-1700	USA, KWHR Naalehu HI	9930as		
		17850af		1600-1700	USA, VOA Special English	13600af	15445af	17895af
1600-1645	Germany, Deutsche Welle	6140eu	6170as 7225as 9735af	1600-1700	USA, Voice of America	6035af	6110as	7125as 9575as
		11785as	15145af 15380as 17800af			9760as	11920af	12040af 13710af
		17810as				15205as	15225af	15240af 21635as
1600-1630 s	Germany, Universal Life	15105af		1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu
1600-1630	Germany, Voice of Hope	15715as		1600-1700	USA, WGTG McCaysville GA	9400va	12172am	
1600-1700 a	Germany, Good News World R	15105af		1600-1700	USA, WHRA Greenbush ME	17650af		
1600-1700	Germany, Overcomer Ministr	5850eu	13810me	1600-1700	USA, WHRI Noblesville IN	13760na	15105sa	
1600-1700	Guam, AWR/KSDA	9355as		1600-1700	USA, WJCR Upton KY	7490na	13595na	
1600-1630 as	Guam, TWR/KTWR	15330as		1600-1700	USA, WRNO New Orleans LA	7395na	15420va	
1600-1630	Iran, VOIRI	7250as	11680as 13605as 15150as	1600-1700	USA, WSHB Cypress Crk SC	18915af		
1600-1700	Jordan, Radio	11690eu		1600-1700	USA, WTJC Newport NC	9370na		
1600-1700	Kenya, Kenya BC Corp	4935do		1600-1700	USA, WWCR Nashville TN	9475na	12160na	13845na 15685na
1600-1700	Lebanon, Voice of Hope	6280me	11530va	1600-1700	USA, WYFR Okeechobee FL	11830na	15215na	15695eu 17510eu
1600-1700 vl	Lesotho, Radio	4800do				17760na	21525af	
1600-1700 vl	Malawi, MBC	3380do				9865au	13765au	15500au
1600-1700	Malaysia, Radio	7295do		1600-1630 a	Vatican City, Vatican R	9865au		
1600-1630	Mexico, Radio Mexico Intl	9705am		1600-1700	Zambia, Christian Voice	4965do		
1600-1700	N Marianas, KFBS Saipan	9465as	9495as	1600-1700	Zambia, Natl BC Corp	6165do	6265do	
1600-1625	Netherlands, Radio	12070as	12090as 15590as	1600-1630 vl	Zimbabwe, Zimbabwe BC	5975do		
1600-1650 occsnal	New Zealand, R NZ Intl	6145va		1605-1615 mtwhf	UK, BBC World Service	5990as		
1600-1700 vl	Nigeria, Radio/Ibadan	6050do		1615-1630 a	UK, BBC World Service	11860af		
1600-1700 vl	Nigeria, Radio/Kaduna	4770do		1630-1645	Egypt, Radio Cairo	11875af	15255af	
1600-1700	Nigeria, Voice of	7255af	15120va	1630-1700	Georgia, Georgian Radio	6180me		
1600-1656	North Korea, R Pyongyang	3560va	6540va 9600va 9975va	1630-1700 s	Seychelles, FEBA Radio	11605as		
1600-1630	Pakistan, Radio	7230do	11570me 15320af 15465me	1630-1645 a	UK, BBC World Service	9515na	11860af	
		17510me		1630-1657	Vietnam, Voice of	7145eu	9730eu	
1600-1700	Palau, KHBN/Voice of Hope	9955as	9965as	1630-1700 vl	Zimbabwe, Zimbabwe BC	4828do		
1600-1700 vl	Papua New Guinea, NBC	4890do		1645-1700	Egypt, Radio Cairo	15255af		
1600-1700	Russia, Voice of Russia WS	4940me	4965me 7260me 7305as	1645-1700	Germany, Deutsche Welle	6140eu		
		12055me		1645-1700 a	UK, BBC World Service	9515na		
				1645-1700 smwfa	UK, BBC World Service	11860af		
				1650-1700 mtwhf	New Zealand, R NZ Intl	17675va		

## SELECTED PROGRAMS

## Sundays

1600	USA, KTBN Salt Lk City UT: The Coral Ridge Hour. See S 0000.
1600	USA, VOA Washington DC (af): Nightline Africa. News, correspondent reports, backgrounders, and features on world and African issues.
1600	USA, WTJC Newport NC: Friendship Pulpit.
1630	USA, WTJC Newport NC: Music.

## Mondays

1600	USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0200.
1600	USA, WTJC Newport NC: Truck Driver Special.
1630	USA, KTBN Salt Lk City UT: Our Town. See S 1300.
1630	USA, VOA Washington DC (af): Africa World Tonight. News, sports, correspondent reports, backgrounders, and features on world and African issues.
1630	USA, WTJC Newport NC: Music.
1645	USA, WTJC Newport NC: A Moment of Truth.
1646	USA, WTJC Newport NC: Music.

## Tuesdays

1600	USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0200.
1600	USA, WTJC Newport NC: Truck Driver Special.
1630	USA, KTBN Salt Lk City UT: Calling Dr. Whitaker. The doctor talks to a guest about medical matters.

1630	USA, VOA Washington DC (af): Africa World Tonight. See Af 1630.
1630	USA, WTJC Newport NC: Music.
1645	USA, WTJC Newport NC: A Moment of Truth.
1646	USA, WTJC Newport NC: Music.

## Wednesdays

1600	USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0200.
1600	USA, WTJC Newport NC: Truck Driver Special.
1615	UK, BBC London (AS): R&B with DJ EE. See W 0530.
1630	USA, KTBN Salt Lk City UT: Lifestyle Magazine. A Faith for Today production that has brought family values to television since 1950.
1630	USA, VOA Washington DC (af): Africa World Tonight. See Af 1630.
1630	USA, WTJC Newport NC: Music.
1645	USA, WTJC Newport NC: A Moment of Truth.
1646	USA, WTJC Newport NC: Music.

## Thursdays

1600	USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0200.
1600	USA, WTJC Newport NC: Truck Driver Special.
1630	USA, KTBN Salt Lk City UT: Steve Brock. Steve sings songs of praise.
1630	USA, VOA Washington DC (af): Africa World Tonight. See Af 1630.

1630	USA, WTJC Newport NC: Music.
1645	USA, WTJC Newport NC: A Moment of Truth.
1646	USA, WTJC Newport NC: Music.

## Fridays

1600	USA, KTBN Salt Lk City UT: The Believer's Voice of Victory. See M 0200.
1600	USA, WTJC Newport NC: Truck Driver Special.
1630	USA, KTBN Salt Lk City UT: God's News Behind the News. Ray Brubaker presents the "news" from St. Petersburg, Florida.
1630	USA, VOA Washington DC (af): Africa World Tonight. See Af 1630.
1630	USA, WTJC Newport NC: Music.
1645	USA, WTJC Newport NC: A Moment of Truth.
1646	USA, WTJC Newport NC: Music.

## Saturdays

1600	Merlin Network One: Global Sound Kitchen.
1600	USA, KTBN Salt Lk City UT: Just the Facts. A program for youth ages 10 to 16.
1600	USA, VOA Washington DC (af): Nightline Africa. See Af 1600.
1600	USA, WTJC Newport NC: Children's Gospel Hour.
1630	USA, KTBN Salt Lk City UT: Kids Against Crime. See A 1300.
1630	USA, WTJC Newport NC: Music.

## FREQUENCIES

1700-1730	Afghanistan, VO Shariah	4774do	7077do			1800-1900	Anguilla,Caribbean Beacon	11775am			
1700-1800	Anguilla,Caribbean Beacon	11775am				1800-1900 mtwhf	Argentina, RAE	15345eu			
1700-1800 vl	Australia, ABC/Alice Spgs	2310do				1800-1900 vl	Australia, ABC/Alice Spgs	2310do			
1700-1800 vl	Australia, ABC/Katherine	2485do				1800-1900 vl	Australia, ABC/Katherine	2485do			
1700-1800 vl	Australia, ABC/Tent Creek	2325do				1800-1900 vl	Australia, ABC/Tent Creek	2325do			
1700-1800	Australia, Radio	5995as	6180as	9500as	9580as	1800-1900	Australia, Radio	6080as	7240as	9500as	9580as
		9660as	11880as					9600as	11880as		
1700-1800 vl	Botswana, Radio	4820do				1800-1830	Azerbaijan, Voice of	9165eu			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do				1800-1900	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu
1700-1800	Canada, CFRX Toronto	6070do				1800-1900 vl	Botswana, Radio	4820do			
1700-1800	Canada, CFVP Calgary	6030do				1800-1900	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CHNX Halifax	6130do				1800-1900	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CKZN St John's	6160do				1800-1900	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZU Vancouver	6160do				1800-1900	Canada, CKZN St John's	6160do			
1700-1756	China, China Radio Intl	5220af	7405af	9570af	9745af	1800-1900	Canada, CKZU Vancouver	6160do			
		11910af	15300af			1800-1900	Costa Rica,RF Peace Intl	25930va			
1700-1800	Costa Rica,RF Peace Intl	25930va				1800-1827	Czech Rep, R Prague Intl	5930eu	7315va		
1700-1727	Czech Rep, R Prague Intl	5930eu	17485af			1800-1830	Egypt, Radio Cairo	15255af			
1700-1800	Egypt, Radio Cairo	15255af				1800-1900	Eqt Guinea, Radio Africa	15186af			
1700-1800	Eqt Guinea, Radio Africa	15186af				1800-1900	Germany, Deutsche Welle	6140eu			
1700-1730	France, Radio France Intl	11615af	15210af			1800-1900 vl	Ghana, Ghana BC Corp	4915do			
1700-1800	Germany, Deutsche Welle	6140eu				1800-1815	Greece, Voice of	7450eu	9425eu	17565sa	17705na
1700-1800	Germany, Voice of Hope	11725as				1800-1900	India, All India Radio	7410eu	9650af	9950eu	11620eu
1700-1800 a	Germany,Good News World R	11795me						11935af	13750af	15075af	15200af
1700-1800 vl	Ghana, Ghana BC Corp	4915do				1800-1900 vl	Italy, IRRS	3985va			
1700-1800	Japan, Radio/NHK	9825eu	12000na	15355af		1800-1900	Kenya, Kenya BC Corp	4935do			
1700-1730	Jordan, Radio	11690eu				1800-1900	Kuwait, Radio	11990va			
1700-1800	Kenya, Kenya BC Corp	4935do				1800-1900 vl	Lesotho, Radio	4800do			
1700-1800	Lebanon, Voice of Hope	6280me	11530va			1800-1815	Liberia,LCN/R Liberia Int	5100do			
1700-1800 vl	Lesotho, Radio	4800do				1800-1900 vl	Malawi, MBC	3380do			
1700-1800 vl	Malawi, MBC	3380do				1800-1900	Malaysia, Radio	7295do			
1700-1800	Malaysia, Radio	7295do				1800-1900	N Marianas, KFBS Saipan	9465as			
1700-1800	N Marianas, KFBS Saipan	9465as				1800-1830	Netherlands, Radio	6020af	11655af		
1700-1800 mtwh	New Zealand, R NZ Intl	17675va				1800-1850 mtwhf	New Zealand, R NZ Intl	17675va			
1700-1800 vl	Nigeria, Radio/Ibadan	6070do				1800-1900 vl	Nigeria, Radio/Ibadan	6050do			
1700-1800 vl	Nigeria, Radio/Kaduna	4770do				1800-1900 vl	Nigeria, Radio/Kaduna	4770do			
1700-1800	Nigeria, Radio/Lagos	3326do				1800-1900	Nigeria, Radio/Lagos	3326do			
1700-1800	Palau, KHBN/Voice of Hope	9955as	9965as			1800-1900 vl	Nigeria, Voice of	7255af	15120va		
1700-1800 vl	Papua New Guinea, NBC	4890do				1800-1900	North Korea, R Pyongyang	3760va	11710va		
1700-1756	Romania, R Romania Intl	9625eu	11740eu	11940eu	15365eu	1800-1900	Palau, KHBN/Voice of Hope	9965as			
1700-1800	Russia,Voice of Russia WS	5935me	7260me	7445me	9470me	1800-1900 vl	Papua New Guinea, NBC	4890do			
1700-1730	S Africa, Channel Africa	17870af				1800-1900	Philippines, R Pilipinas	11720as	15190as	17720as	
1700-1800	Sierra Leone, SLBS	5980do				1800-1855	Poland, Radio Polonia	6000eu	7285eu		
1700-1745	Swaziland, Trans World R	9500af				1800-1900	Russia,Voice of Russia WS	5940eu	5965eu	9340eu	9480eu
1700-1800	Tanzania, Radio	5050af						9890eu	11510af		
1700-1800	Uganda, Radio	4976do				1800-1830	S Africa, AWR Africa	5960af	6100af		
1700-1800	UK, BBC World Service	3255af	3915af	5975as	6005af	1800-1830	S Africa, Channel Africa	17870af			
		6190af	6195eu	7160as	9410eu	1800-1900	Sierra Leone, SLBS	3316do			
		9510as	9630af	9740as	11980me	1800-1900 vl	Solomon Islands, SIBC	5020do			
		12095eu	15400af	15420af	17830af	1800-1810	Somalia, Radio Mogadishu	6690af			
		17840na				1800-1900	Sudan, Radio Omdurman	9200va			
1700-1800 a	Uk, Merlin Network One	3965eu	9655eu			1800-1830	Swaziland, Trans World R	3200af	9500af		
1700-1800 mtwhf	UK, Merlin Network One	6185eu				1800-1900	Taiwan, Radio Taiwan Intl	3965eu			
1700-1800	USA, Armed Forces Network	4278am	6458am	12689am		1800-1900	Tanzania, Radio	5050af			
1700-1800	USA, KAIJ Dallas TX	13815va				1800-1900	UK, BBC World Service	3255af	3955eu	6190af	6195eu
1700-1800	USA, KTBN Salt Lk City UT	15590na						9410eu	9510as	9740pa	11980me
1700-1800	USA, KWHR Naalehu HI	9930as						12095eu	15400af	15420af	17830af
1700-1800	USA, Voice of America	6040af	6110as	7125as	9760as	1800-1830	UK, RTE Radio	15315me			
		11920af	12040af	15205as	15240af	1800-1900	USA, Armed Forces Network	4278am	6458am	12689am	
		15445af	17895af	21510af		1800-1900	USA, KAIJ Dallas TX	13815va			
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as	1800-1900	USA, KJES Vado NM	15385na			
		9795as	11955as	12005as	15255as	1800-1900	USA, KTBN Salt Lk City UT	15590na			
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15745eu		1800-1900	USA, KWHR Naalehu HI	9930as			
1700-1800	USA, WGTG McCaysville GA	9400va	12172am			1800-1900	USA, Voice of America	6035as	6040af	9780as	11920af
1700-1800	USA, WHRA Greenbush ME	17650af						11975af	13710af	15240af	15580af
1700-1800	USA, WHRI Noblesville IN	13760na	15105na			1800-1900	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800	USA, WINB Red Lion PA	13800eu				1800-1900	USA, WGTG McCaysville GA	9400va	12172am		
1700-1800	USA, WJCR Upton KY	7490na	13595na			1800-1900	USA, WHRA Greenbush ME	17650af			
1700-1800 irreg	USA, WMLK Bethel PA	9465am				1800-1900	USA, WHRI Noblesville IN	9495sa	13760na		
1700-1800	USA, WRNO New Orleans LA	7395na	15420va			1800-1900	USA, WINB Red Lion PA	13800eu			
1700-1800	USA, WSHB Cypress Crk SC	18915af				1800-1900	USA, WJCR Upton KY	7490na	13595na		
1700-1800	USA, WTJC Newport NC	9370na				1800-1900 irreg	USA, WMLK Bethel PA	9465am			
1700-1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	1800-1900	USA, WRNO New Orleans LA	7395na	15420va		
1700-1800	USA, WYFR Okeechobee FL	15695eu	17510eu			1800-1900	USA, WSHB Cypress Crk SC	15665eu	18915af		
1700-1800	Zambia, Christian Voice	4965do				1800-1900	USA, WTJC Newport NC	9370na			
1700-1800	Zambia, Natl BC Corp	6165do	6265do			1800-1900	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1700-1800 vl	Zimbabwe, Zimbabwe BC	4828do				1800-1900	USA, WYFR Okeechobee FL	15695eu			
1715-1800 vl	Libya, Voice of Africa	15235va	15415va	15435va		1800-1900 vl	Vanuatu, Radio	4960do			
1715-1730	Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu	1800-1827	Vietnam, Voice of	7145eu	7440eu		
		15595eu				1800-1900	Yemen, Rep of Yemen Radio	9780me			
1720-1750 fa	Armenia, Trans World R	7375eu				1800-1900	Zambia, Christian Voice	4965do			
1720-1750	Monaco, Trans World Radio	7375as				1800-1900	Zambia, Natl BC Corp	6165do	6265do		
1730-1800	Austria, R Austria Intl	6155va	9655va	13710va	13730va	1800-1900 vl	Zimbabwe, Zimbabwe BC	4828do			
1730-1800	Guam, AWR/KSDA	7455as	7560as			1830-1900	Ascension Is.RTE Radio	21630af			
1730-1800	Netherlands, Radio	6020af	11655af			1830-1856	Belgium,R Vlaanderen Intl	5910eu	9925eu	13600eu	17695af
1730-1800	Philippines, R Pilipinas	11720as	15190as	17720as		1830-1900	Canada, RTE Radio	13640va			
1730-1800	S Africa, AWR Africa	12130af				1830-1900	Georgia, Georgian Radio	1910eu			
1730-1800	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		1830-1900	Kiribati, Radio	9810do			
1730-1745 mtwh	Swaziland, Trans World R	3200af				1830-1900	Netherlands, Radio	6020af	9895af	11655af	13700af
1730-1800 s	UK, BBC World Service	5985as	7390as	9750as	11660as			17805af			
1730-1800	Vatican City, Vatican R	13765af	15570af	17515af		1830-1900 w	Philippines, FEBC R Intl	9465eu			
1745-1800	Albania, R Tirana Intl	7210eu	9755eu			1830-1900	Swaziland, Trans World R	3200af			
1745-1800	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu	1830-1900 mtwhfa	Sweden, Radio	6065eu			
1745-1800	India, All India Radio	7410eu	9650af	9950eu	11620eu	1830-1900 s	USA, Voice of America	9845af	13675af	15445af	
		11935af	13750af	15075af	15200af	1840-1850	Greece, Voice of	12105af	15630me		
		3200af	9500af			1850-1900	New Zealand, R NZ Intl	17675va			
1745-1800	Swaziland, Trans World R	3200af									

## FREQUENCIES

[illegible]



## FREQUENCIES

2100-2200	Anguilla,Caribbean Beacon	11775am				2130-2200	UK, Merlin Network One	6010eu			
2100-2130 vl	Australia, ABC/Alice Spgs	2310do				2130-2200 smtwhf	USA, Voice of America	6035af	7415af	11975af	13710af
2100-2130 vl	Australia, ABC/Katherine	2485do						15240af	15580af	17725af	
2100-2200 vl	Australia, ABC/Katherine	5025do				2130-2200	Uzbekistan, R Tashkent	7105eu	9540eu		
2100-2130 vl	Australia, ABC/Tent Creek	2325do				2145-2200 mtwhf	USA, WRMI/R Miami Intl	7385na			
2100-2130	Australia, Radio	7240as	9500as	9580as	9660as	2200 UTC					
		11880as	12080as	21740as							
2100-2200 vl	Botswana, Radio	3356do				2200-2300	Anguilla,Caribbean Beacon	6090am			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do				2200-2300 vl	Australia, ABC/Katherine	5025do			
2100-2200	Canada, CFRX Toronto	6070do				2200-2300 vl	Australia, ABC/Tent Creek	4910do			
2100-2200	Canada, CFVP Calgary	6030do				2200-2300	Australia, Radio	9660as	12080as	15415as	17580as
2100-2200	Canada, CHNX Halifax	6130do						17705as	17795as	21740as	
2100-2200	Canada, CKZN St John's	6160do				2200-2300	Bulgaria, Radio	7535eu	7545eu		
2100-2200	Canada, CKZU Vancouver	6160do				2200-2300	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, Radio Canada Intl	5995va	7235va	9770va	9805va	2200-2300	Canada, CFRX Toronto	6070do			
		11945va	13650va	13690va	15325va	2200-2300	Canada, CFVP Calgary	6030do			
		17820va				2200-2300	Canada, CHNX Halifax	6130do			
2100-2200	Costa Rica,RF Peace Intl	15050va	25930va			2200-2300	Canada, CKZN St John's	6160do			
2100-2105	Croatia, Croatian Radio	11605af				2200-2300	Canada, CKZU Vancouver	6160do			
2100-2130	Cuba, Radio Havana	13750eu				2200-2259	Canada, Radio Canada Intl	5995va	7235va	9805va	11705as
2100-2127	Czech Rep, R Prague Intl	5930na	9430as					13690va	15320va		
2100-2200	Ecuador, HCJB	17660eu	21455va			2200-2256	China, China Radio Intl	7170eu			
2100-2115	Egypt, Radio Cairo	15375af				2200-2300	Costa Rica,RF Peace Intl	15050va	25930va		
2100-2200	Eqt Guinea, Radio Africa	15186af				2200-2245	Egypt, Radio Cairo	9990eu			
2100-2145	Germany, Deutsche Welle	9615af	9690af	9765as	15135as	2200-2300	Eqt Guinea, Radio Africa	15186af			
		15410va	17560as			2200-2300	Germany,Overcomer Ministr	7285sa			
2100-2200	India, All India Radio	7150va	7410eu	9650eu	9910au	2200-2300 vl	Ghana, Ghana BC Corp	4915do			
		9950eu	11620va	11715au		2200-2210 s	Greece, Voice of	9425au	11645au		
2100-2200 vl	Italy, IRRS	3985va				2200-2230	Hungary, Radio Budapest	6025eu			
2100-2200	Japan, Radio/NHK	6035pa	9725eu	11850pa	17825va	2200-2230	India, All India Radio	7150va	7410eu	9650eu	9910au
2100-2130	Kenya, Kenya BC Corp	4885do	4935do					9950eu	11620va	11715au	
2100-2130	Kiribati, Radio	9810do				2200-2230	Iran, VOIRI	11740as	13720as	13745as	
2100-2200 vl	Lesotho, Radio	4800do				2200-2300 vl	Italy, IRRS	3985va			
2100-2115	Liberia,LCN/R Liberia Int	5100do				2200-2225	Italy, RAI Intl	9675as	11900as		
2100-2200 vl	Malawi, MBC	3380do				2200-2215	Liberia,LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do				2200-2210 vl	Malawi, MBC	3380do			
2100-2200	Namibia, NBC	3270af	3289af			2200-2300	Malaysia, Radio	7295do			
2100-2200	New Zealand, R NZ Intl	17675va				2200-2300	Namibia, NBC	3270af			
2100-2200 vl	Nigeria, Radio/Ibadan	6050do				2200-2300	New Zealand, R NZ Intl	17675va			
2100-2200 vl	Nigeria, Radio/Kaduna	4770do				2200-2300 vl	Nigeria, Radio/Ibadan	6050do			
2100-2200	Nigeria, Radio/Lagos	3326do				2200-2300	Nigeria, Radio/Kaduna	4770do			
2100-2200	Palau, KHBN/Voice of Hope	9985as				2200-2300	Nigeria, Radio/Lagos	3326do			
2100-2200 vl	Papua New Guinea, NBC	9675do				2200-2300 vl	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
2100-2125	Poland, Radio Polonia	6035eu	6095eu	7285eu	9525eu	2200-2300 vl	Papua New Guinea, NBC	9675do			
2100-2156	Romania, R Romania Intl	5955eu	7195eu	7215eu	9690eu	2200-2230	Serbia, Radio Yugoslavia	6100eu			
2100-2200	Russia,Voice of Russia WS	5940eu	5965eu	6205eu	7300eu	2200-2300 vl	Sierra Leone, SLBS	3316do			
		7320eu	7340eu	9890eu		2200-2300 vl	Solomon Islands, SIBC	5020do			
2100-2200	Sierra Leone, SLBS	3316do				2200-2230	South Korea Intl	3980eu			
2100-2200 vl	Solomon Islands, SIBC	5020do				2200-2300 as	Spain, R Exterior Espana	9595af	9680eu		
2100-2130	South Korea, R Korea Intl	6480eu	15575eu			2200-2210	Syria, Radio Damascus	12085na	13610na		
2100-2200 mtwhf	Spain, R Exterior Espana	9595af	9680eu			2200-2210	Taiwan, Radio Taiwan Intl	5810eu	9355eu		
2100-2105	Syria, Radio Damascus	12085eu	13610eu			2200-2300	UK, BBC World Service	3955eu	5965as	5975na	6175na
2100-2200	UK, BBC World Service	3255af	3915as	3955eu	5965as			6195va	7110as	9590na	9660as
		5975va	6005af	6180eu	6190af			9915eu	11835af	11955as	12080pa
		6195va	9410pa	9740pa	11835af			12095sa	15400af		
		12095sa	15400af			2200-2300 f	UK, Merlin Network One	6170eu	7165eu	9615eu	
		4278am	6458am	12689am		2200-2300	Ukraine, U Ukraine Intl	4820eu	5905eu	6020eu	6030va
		13815va						6080eu	7205eu	7420eu	9560eu
		15590na						9610eu	9785na	9810va	
		17510as				2200-2300	USA, Armed Forces Network	4278am	6458am	12689am	
		6035af	6040me	6095as	7415af			13815va			
		9595as	9760as	11870pa	11975af			15590na			
		13710af	15185pa	15240af	15580af			17510as			
		17725af	17735as	17820as		2200-2300	USA, KAIJ Dallas TX	7215as	9770as	9890as	11760as
2100-2200	USA, WBCQ Monticello ME	7415na				2200-2300	USA, KAIJ Dallas TX	13815va			
2100-2200	USA, WEWN Birmingham AL	9975eu	11875na	13615na		2200-2300	USA, KTNB Salt Lk City UT	15590na			
2100-2200	USA, WGTG McCaysville GA	9400va	12172am			2200-2300	USA, WHRA Greenbush ME	17650af			
2100-2200	USA, WHRA Greenbush ME	17650af				2200-2230	USA, WHRA Greenbush ME	17650af			
2100-2200	USA, WHRI Noblesville IN	5745na	9495sa				USA, WHRI Noblesville IN	5745na	9495sa		
2100-2200	USA, WINB Red Lion PA	13790eu				2200-2300	USA, WINB Red Lion PA	13790eu			
2100-2200	USA, WJCR Upton KY	7490na	13595na			2200-2300	USA, WINB Red Lion PA	13790eu			
2100-2200 s	USA, WRMI/R Miami Intl	9955am				2200-2300	USA, WJCR Upton KY	7490na	13595na		
2100-2200	USA, WRNO New Orleans LA	7395na	15420va			2200-2300 mtwhf	USA, WRMI/R Miami Intl	7385na			
2100-2200	USA, WSHB Cypress Crk SC	11550eu	13770eu	15665af		2200-2300 a	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WTJC Newport NC	9370na				2200-2300	USA, WRNO New Orleans LA	7395na	15420va		
2100-2200	USA, WWCR Nashville TN	7435na	9475na	12160na	13845na	2200-2300	USA, WSHB Cypress Crk SC	7395na	15420va		
2100-2200	USA, WYFR Okeechobee FL	7355eu	11565eu	15565af	21525af	2200-2300	USA, WTJC Newport NC	9370na			
2100-2200 vl	Vanuatu, Radio	4960do				2200-2300	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2100-2110	Vatican City, Vatican R	4005eu	5883eu	7250eu		2200-2300	USA, WYFR Okeechobee FL	11740na	15565af	21525af	
2100-2200	Zambia, Christian Voice	4965do				2200-2300 vl	Vanuatu, Radio	4960do			
2100-2200	Zambia, Natl BC Corp	6165do	6265do			2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	4828do				2230-2300	Albania, R Tirana Intl	7130eu	9540eu		
2110-2200 s	Greece, Voice of	9425au	11645au			2230-2300	Austria, R Austria Intl	5945eu	6155eu	13730af	
2100-2200	Syria, Radio Damascus	12085na	13610na			2230-2256	Belgium,R Vlaanderen Intl	13670na			
2115-2145 mtwhfa	Armenia, Voice of	4810eu	9965eu			2230-2300	Cuba, Radio Havana	9550am			
2115-2200	Egypt, Radio Cairo	9990eu	15375af			2230-2257	Czech Rep, R Prague Intl	7345na	9435af		
2115-2130 mtwhf	UK, BBC Caribbean Report	5975am	11765am	15390am		2230-2255	Hungary, Radio Budapest	3975eu			
2115-2130 as	UK, BBC World Service	5975na				2230-2255	Moldova, R Moldova Intl	7520eu			
2130-2200 vl	Australia, ABC/Tent Creek	4910do				2230-2300	Sweden, Radio	6065eu	7325eu		
2130-2200	Australia, Radio	7240as	9660as	11880as	12080as	2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
		15415as	17580as	21740as				13625as			
2130-2200 th	Belarus, R Minsk	7105eu	7210eu			2245-2300	Vatican City, Vatican R	7305au	9600au	11830au	
2130-2156	China, China Radio Intl	5965eu	7590eu	9535eu	13675af						
		15500af									
2130-2200	Guam, AWR/KSDA	9495as	11985as								
2130-2200	Iran, VOIRI	11740as	13720as	13745as							
2130-2200	South Korea, R Korea Intl	15575as									
2130-2200	Turkey, Voice of	9525as									
2130-2145 t f	UK BBC Calling Falklands	11680sa									





## FREQUENCIES

2300-0000	Anguilla, Caribbean Beacon	6090am				2300-0000	UK, BBC World Service	3915as	5965as	5975na	6035as
2300-0000 vl	Australia, ABC/Katherine	5025do					6175na 6195va	7110as	9590na	9915eu	11945as
2300-0000 vl	Australia, ABC/Tent Creek	4910do					11955as 12095sa	15280as			
2300-0000	Australia, Radio	9660as	12080as	15415as	17580as	2300-0000	UK, Merlin Network One	3975eu			
		17705as	17795as	21740as		2300-0000	USA, Armed Forces Network	4278am	6458am	12689am	
2300-0000	Canada, CBC N Quebec Svc	9625do				2300-0000	USA, KAIJ Dallas TX	13815va			
2300-0000	Canada, CFRX Toronto	6070do				2300-0000	USA, KTVN Salt Lk City UT	15590na			
2300-0000	Canada, CFVP Calgary	6030do				2300-0000	USA, KWHR Naalehu HI	17510as			
2300-0000	Canada, CHNX Halifax	6130do				2300-0000	USA, VOA Special English	6045as	7140as	9545as	11925as
2300-0000	Canada, CKZN St John's	6160do						15395as			
2300-0000	Canada, CKZU Vancouver	6160do				2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
2300-2330	Canada, Radio Canada Intl	5960na	6040na	9535am	9755na			15185as	15290as	17735as	17820as
		11865am				2300-0000	USA, WBCQ Monticello ME	7415na			
2300-2356	China, China Radio Intl	5990na				2300-0000	USA, WEWN Birmingham AL	9385na	9975eu	13615na	
2300-0000	Costa Rica, RF Peace Intl	6975va	15050va	25930va		2300-0000	USA, WGTG McCaysville GA	5085va	6890am		
2300-2330	Cuba, Radio Havana	9550am				2300-0000	USA, WHRA Greenbush ME	7580af			
2300-0000	Egypt, Radio Cairo	9900am				2300-0000	USA, WHRI Noblesville IN	5745na	9495sa		
2300-2345	Germany, Deutsche Welle	9515as	9815as	13690as		2300-0000	USA, WINB Red Lion PA	11950am			
2300-0000 s	Germany, Good News World R	9405sa				2300-0000	USA, WJCR Upton KY	7490na	13595na		
2300-0000 vl	Ghana, Ghana BC Corp	4915do				2300-0000 a	USA, WRMI/R Miami Intl	9955am			
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as	2300-0000	USA, WRNO New Orleans LA	7355na			
		13625as				2300-0000	USA, WSHB Cypress Crk SC	7510va	13770eu	15285sa	
2300-2315 vl	Italy, IRRS	3985va				2300-0000	USA, WTJC Newport NC	9370na			
2300-2315	Liberia, LCN/R Liberia Int	5100do				2300-0000	USA, WWCR Nashville TN	3215na	5070na	7435na	13845na
2300-0000	Malaysia, Radio	7295do				2300-0000	USA, WYFR Okeechobee FL	11740na			
2300-2330	Mexico, Radio Mexico Intl	9705am				2300-0000 vl	Vanuatu, Radio	4960do			
2300-0000	Namibia, NBC	3270af	3289af			2300-2315	Vatican City, Vatican R	7305au	9600au	11830au	
2300-2359	New Zealand, R NZ Intl	17675va				2315-0000 vl	Libya, Voice of Africa	15235va	15415va	15435va	
2300-2330 vl	Nigeria, Radio/Ibadan	6050do				2330-0000 mtwhf	Canada, Radio Canada Intl	5960na	9755na		
2300-2330 vl	Nigeria, Radio/Kaduna	4770do				2330-0000 as	Canada, Radio Canada Intl	6040na	9535am	11865am	
2300-2330	Nigeria, Radio/Lagos	3326do				2330-2357	Czech Rep, R Prague Intl	7345na	9435na		
2300-0000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as		2330-0000 vl	Guatemala, Radio Cultural	3300do			
2300-0000 vl	Papua New Guinea, NBC	9675do				2330-0000	Malaysia, RTM Sarawak	7160do			
2300-2356	Romania, R Romania Intl	7195eu	9570na	9690eu	11940na	2330-0000	Netherlands, Radio	6165na	9845na		
2300-0000	Sierra Leone, SLBS	3316do				2330-0000	USA, VOA Special English	6045as	7130as	7140as	9535as
2300-0000	Singapore, RCorp Singapore	6150do						9545as	11805as	11925as	15205as
2300-0000 vl	Solomon Islands, SIBC	5020do						15395as			
2300-0000	Turkey, Voice of	5980eu	6120eu	6135eu	9655va	2330-2357	Vietnam, Voice of	7145as	12020as		

## SELECTED PROGRAMS

### Sundays

- 2300 USA, KTVN Salt Lk City UT: Get Ready. Bishop Jakes preaches from Crenshaw Christian Center in Los Angeles.
- 2300 USA, WTJC Newport NC: News and Weather.
- 2305 USA, WTJC Newport NC: Music.
- 2330 Czech Rep, Radio Prague: News. See S 0100.
- 2330 USA, WTJC Newport NC: Peoples Gospel Hour.
- 2334 Czech Rep, Radio Prague: From the Weeklies. See S 1134.
- 2340 Greece, Voice of: News. See S 0140.
- 2341 Czech Rep, Radio Prague: A Letter from Prague. See S 1141.
- 2346 Czech Rep, Radio Prague: Readings from Czech Literature. See S 1146.

### Monday-Friday

- 2300 USA, KTVN Salt Lk City UT: Praise the Lord. See S 0500.
- 2300 USA, WTJC Newport NC: News and Weather.
- 2330 Czech Rep, Radio Prague: News. See S 0100.
- 2330 USA, WTJC Newport NC: Bible Believers Broadcast.
- 2334 Czech Rep, Radio Prague: Current Affairs. See M 1134.
- 2340 Greece, Voice of: News. See S 0140.
- 2345 USA, WTJC Newport NC: Music.

### Mondays

- 2305 USA, WTJC Newport NC: Music.
- 2346 Czech Rep, Radio Prague: One on One. See M 1146.

### Tuesdays

- 2305 USA, WTJC Newport NC: Music.
- 2346 Czech Rep, Radio Prague: Talking Point. See T 1146.

### Wednesdays

- 2305 USA, WTJC Newport NC: Music.
- 2346 Czech Rep, Radio Prague: Ten Years After. See W 1116.

### Thursdays

- 2305 USA, WTJC Newport NC: Music.
- 2342 Czech Rep, Radio Prague: Press Review. See H 1142.
- 2344 Czech Rep, Radio Prague: Economic Report. See H 1144.
- 2350 Czech Rep, Radio Prague: I'd Like You to Meet. See H 1149.

### Fridays

- 2300 Merlin Network One: Global Sound Kitchen.
- 2305 USA, WTJC Newport NC: Carolina News Line.
- 2330 UK, BBC London (AS): The Bitter Pill (3rd, 10th, 17th). See T 1130.
- 2340 Czech Rep, Radio Prague: Living Czech. A look at what makes the Czech language unique.
- 2344 Czech Rep, Radio Prague: Mailbox. See F 0118.

### Saturdays

- 2300 USA, KTVN Salt Lk City UT: The Laverne Tripp Family. See H 1230.
- 2300 USA, WTJC Newport NC: News and Weather.
- 2305 USA, WTJC Newport NC: Bob Shelton Gospel Ministries.
- 2320 USA, WTJC Newport NC: Music.
- 2330 Czech Rep, Radio Prague: News. See S 0100.
- 2330 USA, KTVN Salt Lk City UT: Unto the Gentiles. Zola Levitt presents.
- 2340 Greece, Voice of: News. See S 0140.

### Thank You ...

*Additional Contributors to This Month's Shortwave Guide:*

Paul Donegan, Glendale, CA; Glenn Hauser, Enid, OK/*World of Radio, DX Report*; Hans Johnson, AZ/*Ulis Fleming, MD /Cumbre DX/DXing With Cumbre*; Al Quaglieri/*NASWA Journal*; George Woods/*Media Scan*; Giovanni Serra/*The Four Winds*; Robert E. Thomas II, Bridgeport, CT; BBCM; *BBC On-Air*; Zeke Russell, Mariposa, CA; Harold Sellers, *DX Ontario*; Clayton B. Sherman, Hoosick Falls, NY; Russell T. Sova, Wickliffe, OH; *Gatflash!*; *Hard Core DX*; *MARE*; Radio Sweden/*Media Scan*; Usenet Newsgroups.

## How To Use This Table

The *Monitoring Times* propagation table is set up to cover three main areas of the continental US and similar circuits are calculated for each area. If you live in Canada or along the 49<sup>th</sup> parallel, and have access to the Internet, you can check the following sites for similar tables for the Canadian and northern US users at <http://www.odxa.on.ca/rac2txt99.htm>.

In the *MT* tables and on the Canadian web site, the OWF (Optimum Working Frequency) frequency for a particular circuit is displayed. This frequency should give you the best chance, 90% of the time, to hear a station located at the other end of the circuit. If you feel adventurous, look up higher than the OWF for possible signals.

The tabulated OWF is approximately equivalent to 80% of the MUF (Maximum Usable Frequency) so you could still go up in frequency in your search for a signal. For example, if the tabulated OWF is 8.0 MHz, the MUF would be 10 MHz, so you could go lurking in the upper reaches up to 10 MHz. When you reach the MUF, your chances of hearing a good signal have now decreased to about 10%. When the solar activity is high you might find some of the MUF in the 35 to 45 MHz area; you never know what you can find "up there."

The OWF can, at times, have a calculated value of "0". This value is replaced by an asterisk (\*) and the cells are shaded in the *Monitoring Times* chart and on the Web pages. When you see this, do not despair; keep on looking in the vicinity of the last frequency listed for that circuit. The reason why the OWF can have a calculated value of "0" is simply that the ALF (Absorption Frequency) on this circuit, at that particular time of day, is higher than the OWF and, in theory, communication at the OWF should be impossible. But I have been in the radio field long enough to know that theory and practice do not always agree!

As it is relatively safe to assume reciprocity in the forecasts most of the time, the *MT* circuits are labeled "TO/FROM." There are some technical arguments against this assumption, but we know that the *MT* forecasts have been used with success by overseas listeners to listen to North American broadcasts.

A "P" after the name of a circuit indicates that the signal on that particular circuit can be influenced by auroral zone disturbances while traveling over the pole.

Enjoy DXing and use the propagation charts to help you locate unusual signals.

## OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 March 2000 to 14 April 2000 Flux=216 SSN=166

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
<b>TO/FROM US WEST COAST</b>																								
CARIBBEAN	24	23	21	19	17	14	13	12	12	12	12	12	12	12	15	18	19	20	22	22	23	23	24	24
SOUTH AMERICA	19	20	22	23	22	18	16	16	16	15	15	15	14	17	23	27	26	25	25	26	26	26	24	22
WESTERN EUROPE	11	10	10	10	10	10	11	11	10	*	*	*	*	*	12	15	17	18	18	18	16	14	13	12
EASTERN EUROPE (P)	*	10	11	11	12	13	13	11	*	*	*	*	*	*	12	14	16	17	18	16	14	*	*	*
NORTH AFRICA	18	18	18	17	16	15	13	12	*	*	*	*	*	*	14	16	18	19	20	21	21	21	19	19
CENTRAL AFRICA	23	22	20	18	16	14	13	12	*	*	*	*	*	*	15	17	19	20	21	21	21	21	22	22
SOUTH AFRICA	25	21	18	16	14	15	15	14	14	*	*	*	*	*	15	17	19	20	22	24	24	24	25	26
MIDDLE EAST (P)	16	16	16	19	17	15	13	*	*	*	*	*	*	*	13	15	17	19	20	20	18	18	17	16
CENTRAL ASIA (P)	17	19	22	21	19	17	15	*	*	*	*	11	11	11	12	14	16	16	16	15	15	15	14	15
INDIA (P)	21	23	23	21	19	17	15	*	*	*	*	*	11	11	12	14	16	18	19	20	20	19	18	18
THAILAND	24	24	23	23	21	18	16	*	*	*	11	11	11	12	12	13	15	17	19	20	21	19	18	23
AUSTRALIA	31	30	30	30	28	25	22	18	16	15	15	15	15	14	14	15	19	20	17	15	14	19	29	31
CHINA	23	23	23	22	20	18	15	13	12	11	11	11	11	11	12	13	15	16	17	16	16	16	18	20
JAPAN	23	23	23	22	20	18	15	13	12	11	11	11	11	11	11	13	14	15	14	15	17	20	22	23
SOUTH PACIFIC	26	27	28	28	25	22	20	17	15	15	14	14	13	13	13	17	16	19	27	28	28	27	27	26
<b>TO/FROM US MIDWEST</b>																								
CARIBBEAN	27	23	20	19	17	15	15	14	14	14	13	13	17	22	24	25	26	27	27	28	28	28	28	27
SOUTH AMERICA	24	25	26	25	22	20	20	19	19	18	17	17	21	28	31	31	30	29	29	30	30	29	28	25
WESTERN EUROPE	13	12	12	11	11	11	12	12	12	12	12	13	14	15	17	19	20	20	19	19	19	17	15	14
EASTERN EUROPE (P)	10	10	10	10	11	12	12	*	*	*	*	*	*	14	16	17	18	19	18	16	14	12	*	10
NORTH AFRICA	18	17	17	16	14	14	13	12	*	*	*	*	14	15	17	18	19	21	21	21	22	22	19	18
CENTRAL AFRICA	25	23	21	19	17	16	15	14	14	14	*	15	17	18	20	21	23	24	25	25	26	26	26	26
SOUTH AFRICA	12	11	9	8	7	20	19	17	16	14	15	15	16	18	18	19	20	21	23	24	25	26	26	26
MIDDLE EAST	22	22	22	22	21	14	14	*	*	*	*	*	14	15	17	18	19	20	20	19	18	18	17	17
CENTRAL ASIA (P)	16	19	19	17	15	14	*	*	*	*	*	12	13	14	15	17	18	17	16	15	15	14	14	14
INDIA	19	20	19	17	15	*	*	*	*	*	*	*	12	14	15	17	19	20	20	20	20	19	18	17
THAILAND	22	21	20	18	16	*	*	*	*	*	*	11	11	12	14	17	18	19	20	20	20	19	18	22
AUSTRALIA	29	28	28	26	22	19	16	15	14	14	14	14	14	14	16	19	21	20	17	15	14	19	28	29
CHINA (P)	21	21	20	18	16	14	*	*	*	11	11	11	12	13	14	16	17	16	16	15	15	15	17	19
JAPAN	22	22	21	19	16	14	13	12	11	11	11	11	11	12	13	15	16	16	15	15	17	20	21	22
SOUTH PACIFIC	28	29	29	26	23	19	17	16	15	15	15	15	14	15	20	19	18	22	30	31	31	30	29	28
<b>TO/FROM US EAST COAST</b>																								
CARIBBEAN	19	16	15	13	12	12	12	11	10	10	10	10	12	16	19	20	21	21	21	21	21	20	20	20
SOUTH AMERICA	21	23	24	23	21	21	20	19	16	15	15	18	26	29	29	27	27	26	26	27	27	26	24	22
WESTERN EUROPE	13	12	12	12	12	12	12	13	13	13	14	16	18	20	21	21	21	21	21	20	19	17	15	14
EASTERN EUROPE	10	10	10	10	11	12	13	13	12	12	13	14	16	18	19	20	20	20	19	17	14	12	11	11
NORTH AFRICA	18	17	18	17	16	15	15	14	14	14	14	16	19	20	22	23	24	24	24	25	22	21	19	18
CENTRAL AFRICA	25	22	20	19	18	17	17	16	16	15	16	18	22	23	25	26	27	27	27	28	28	28	29	28
SOUTH AFRICA	23	21	18	16	13	15	19	17	17	16	18	24	29	32	33	32	33	31	30	31	31	28	28	26
MIDDLE EAST	17	17	16	16	15	15	14	14	*	*	15	16	18	19	21	23	24	24	24	22	20	19	18	18
CENTRAL ASIA (P)	15	17	17	16	15	14	*	*	*	13	14	15	16	18	19	20	20	18	17	16	15	15	15	14
INDIA (P)	18	19	17	15	14	14	*	*	*	*	*	14	15	18	19	20	21	22	21	21	20	19	18	18
THAILAND (P)	21	19	17	16	*	*	*	*	*	*	12	13	14	17	19	20	20	21	21	22	22	20	18	20
AUSTRALIA	29	28	24	21	18	16	16	15	15	15	15	14	15	17	21	22	22	20	17	15	14	19	28	28
CHINA (P)	20	19	17	16	14	14	*	*	*	12	12	13	14	16	18	18	17	16	15	15	15	14	16	18
JAPAN	23	21	19	17	15	15	14	13	13	13	13	13	14	15	15	15	16	16	15	16	17	19	22	23
SOUTH PACIFIC	30	30	27	24	22	19	18	18	18	18	17	16	18	24	23	20	20	26	33	34	33	*	*	*

\* Unfavorable conditions: Search around the last listed frequency for activity.  
(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

## RNZI Loses Sport; BBCWS Loses Mind

**W**e'll take these two items in sequence, and make a couple of offers to you, to boot!

### ■ RNZI Loses Sport

I had held off on discussing the following in the hope that the situation was only temporary, but we are now moving into the seasons when reception of **Radio New Zealand International (RNZI)** improves markedly throughout North America.

Last summer, in a column focusing on sports play-by-play coverage, there was a cautionary statement that such coverage likely would continue only as long as the **BBC, Radio Australia** and **RNZI** could hold onto increasingly expensive broadcast rights that they still held largely as legacies of their glorious pasts. Unfortunately, as this column is being written, **RNZI** still lacks its former ability to present the nation's sporting fixtures on the air.

A notice on the **RNZI** Internet site [www.rnzi.com](http://www.rnzi.com) dated October 28, 1999, continues to inform listeners that the domestic commercial network *Radio Sport* has suspended **RNZI**'s rights to broadcast its coverage of sporting events because of **RNZI**'s inability to pay rights fees. **RNZI** had never been required to pay rights fees to *Radio Sport* in the past, but that seems not to matter. Linden Clark, manager of **RNZI**, stated in her notice that **RNZI**'s limited budget (less than NZ\$1 million) makes it impossible for the station to pay such fees on its own. She appealed for a sponsor to step forward; but to date, no one has. An e-mailed letter from this writer to *Radio Sport* suggested that the goodwill to be gained by both *Radio Sport* and New Zealand from listeners in the Pacific islands **RNZI** serves vastly outweighs the gain in fees that would be realized – NZ\$35,000 (US\$17,500). That correspondence went unacknowledged and unanswered.

With a recent electoral shift within New Zealand in favor of a governing coalition presumably more friendly to public service broadcasting and **RNZI** in particular, the chances appear marginally better that these popular sports broadcasts might resume. But as of early January, this had not yet taken place.

### ■ BBCWS Loses Mind !

As *MT*'s Glenn Hauser first reported in

his *DX Listening Digest*, **BBC World Service (BBCWS)** Director Mark Byford appeared on a new year *Write On* program and revealed that the service will have yet another major program shuffle. This one will take place in April and will bring the introduction of eight regional programming streams, an increase of five over the current three. Even those with only a short term memory will recall that when the **BBCWS** first implemented streaming in 1995, there were five such streams.

In one sense, some of these added streams have been slowly emerging over the past few months. A significant amount of the programs in the Asia-Pacific stream air on differing schedules for East and South Asia. The Americas and Europe, ostensibly served by a unified Europe-Americas stream, already follow fairly distinct schedules during North American evenings. The programming schedule delivered by satellite differs from that broadcast on shortwave.

Mr. Byford described this round of changes as another step in a continuing effort to satisfy listeners and serve them more efficiently.

However, if they really want to satisfy this listener, they will stop this constant tinkering and rejiggering of the service and revert to one stream with regional variations – the form that the *World Service* had prior to April 1995. This coming change will be no less than the sixth significant reshuffle in the last five years. It has robbed the *World Service* of its former stability and largely annoyed listeners by moving favorite programs all over the schedule – and forcing the cancellation of others. In some ways, it has made it nearly impossible for a listener to establish any kind of listening pattern. Rather than serving listeners more efficiently, this approach seemingly demonstrates more of a lack of consideration toward them.

Interestingly enough, this constant shuffling and reshuffling does not take place in the *World Service*'s Africa stream. Most of that schedule has remained intact for years. Is there any reason for the **BBC** to conclude that stability and predictability are more valued in Africa than elsewhere in the world?

This preoccupation with form over function also is wastefully expensive and makes the service almost indecipherably complicated. The use of multiple streams requires far more continuity staff than would other-

wise be necessary and makes rational transmitter scheduling functionally impossible. Under the current matrix, frequencies leave the air without warning or direction for listeners (and sometimes with the wrong directions), and often in mid-program – by design!

Byford said that news will remain the core programming of the service, especially at key times, and he maintained that there would be no reduction in the amount of feature programming offered.

Where have we heard that before? All one needs to do to debunk that myth is to compare a copy of this month's *BBC On-Air* with any 1993 or '94 issue of *BBC Worldwide*. It's simple math! Budgets organize the deployment of finite resources. The more resources that go into maintaining this hydra of service streams, the fewer resources that are available for the true lifeblood of any radio service – its programming.

If the *World Service* really wants to do something radical, it should return to its roots. Fund more programming and revert to a single stream. As we did then, we'll find the programs to which we want to listen. Just leave them in one place for a while so we can locate them!

### ■ <swprograms@topica.com>

If you're interested in more detailed advance program information that comes in too close to air dates to be used here, or if you are interested in participating in an ongoing discussion with me and others about shortwave programming and international broadcasting, then consider putting that computer to better use and subscribing to the *swprograms* e-mail reflector. It won't cost you a thing and there's two easy ways to sign up: (1) click on <<http://www.topica.com/lists/swprograms>>; or, (2) send a blank e-mail to <[swprograms-subscribe@topica.com](mailto:swprograms-subscribe@topica.com)>. Hope to see you participating there!

### ■ Casting Call

What kind of topics would you like to see addressed in this column? Drop me a line and let me know. My e-mail address is at the top of this page; or, if you prefer the more traditional route, send me a letter or post card with your suggestions in care of this magazine.

Until April, good listening!

# Internet Radio Guide

## BROADCASTING ON THE INTERNET

*Broadcasters are getting on the Internet bandwagon more than ever before, now that the world in getting connected. Here in the U.S., roughly one-third of American households are on-line. This article is the first in a series about Internet radio. Shortwave broadcasting via the Internet is covered in this first edition. Information is categorized alphabetically by region. Future columns will address other aspects of worldwide Internet broadcasting and the more than 3,000 radio stations having an Internet presence.*

### AFRICA

**CHANNEL AFRICA.** South Africa's Internet presence on World Radio Network (WRN) is now augmented with on-demand audio of its Dateline Africa and Network Africa programs, or they may be downloaded for convenience <<http://www.channelafrica.org/english/dateline.html>>.

**RADIO CAIRO.** Live one-hour English broadcasts via the Internet can be heard from Egypt at 1100 and 1700 UTC, except Friday <pnm://rmedia.sis.gov.eg/encoder/live.ra>.

### ASIA-PACIFIC

**RADIO AUSTRALIA.** Radio Australia is a full-time broadcaster, both on shortwave and via the Internet in both Real Media <pnm://media1.abc.net.au/abclive.ra> and Windows Media. A complete program guide is available on line <<http://www.abc.net.au/ra/proguide.htm>>. In addition, on-demand audio is offered for the five most popular programs.

**CHINA RADIO INTERNATIONAL.** CRI's website provides a daily on-demand Real Media feed of each of its news, current affairs, and feature programs. However, you'll have to go to the website for the link to your RealPlayer <<http://www.cri.com.cn/english/>>.

**RADIO KOREA INTERNATIONAL.** RKI provides a nine-minute on-demand daily news program via the Internet. If you visit the website at <[http://rki.kbs.co.kr/rki/frame/frame\\_ontheair.htm](http://rki.kbs.co.kr/rki/frame/frame_ontheair.htm)> you can search for information in the news database. To listen via Real Media, insert the following address into your RealPlayer and change the date to the current date <pnm://210.115.193.23/rki/newsod/rafile/e991228.ra>.

**RADIO NEW ZEALAND INTERNATIONAL.** RNZI provides a live feed of their broadcast while they are on-air via their web site <<http://www.rnzi.com/>>. You can also download their three most popular programs (Pacific News Bulletin, Dateline Pacific, and the biweekly SWL program Mailbox).

**RADIO SINGAPORE INTERNATIONAL.** RSI provides an on-demand Internet feed of each daily English language broadcast. Listen at your own time using your RealPlayer <pnm://165.21.101.65:7070/rsi/rsi\_english.ra0>.

**VOICE OF VIETNAM.** Available for download are Real Media feature programs and episodes of their mailbag program <[http://www.vov.org.vn/1999\\_12\\_28/english/amthanh.htm](http://www.vov.org.vn/1999_12_28/english/amthanh.htm)>.

### CANADA

**CANADIAN BROADCASTING CORPORATION.** CBC offers an extensive list of live streaming audio. Eighteen separate Real Media streams were available from their website at <<http://cbc.ca/audio.html>> offering audio from a variety of sources. Canadian cities included in the list are Calgary, Edmonton, Halifax, Inuwk, Iqaluit, Montreal, Nord

Quebec, Saskatchewan, St. Johns, Vancouver, Toronto, Whitehorse, Winnipeg, and Yellowknife. In addition, feature programs can be heard on-demand, selectable from this same web page.

**RADIO CANADA INTERNATIONAL.** RCI offers a variety of Real Media fare. Two live streams are available at different speeds. Feature programs can be selected on-demand <<http://www.rcinet.ca/pages/real.asp>>. A link to RCI is also available at the CBC website.

### CENTRAL AND SOUTH AMERICA

**RADIO FOR PEACE INTERNATIONAL.** RFPI in Costa Rica offers selected programs in Real Media format <[http://www.vov.org.vn/1999\\_12\\_28/english/amthanh.htm](http://www.vov.org.vn/1999_12_28/english/amthanh.htm)>. RFPI is also testing relay of its signal from Annapolis, MD, encoded in MP3 format.

**VOICE OF THE ANDES.** HCJB in Quito, Ecuador provides a "sound vault" from which you can select on-demand feature programs in Real Media <<http://www.hcjb.org/english/soundvlt.htm>>.

### EUROPE

**BRITISH BROADCASTING CORPORATION.** The BBC is by far the biggest Internet broadcaster in Europe. Live broadcasts are provided at different speeds and in different formats via broadcast.com (which is now known as yahoo!broadcast). If you access the feed from their website, you will suffer the aggravation of being redirected to broadcast.com and the accompanying commercialism consisting of an audio ad on a second browser window. You can bypass this inconvenience by adding the pnm addresses shown below directly to your RealPlayer.

**BBC World Service** (news and entertainment):  
Real Media @ 28.8k <pnm://206.190.42.7/bbc288.ra?StreamID=8535>  
Real Media @ 14.4k <pnm://206.190.42.7/bbc144.ra?StreamID=8533>

**BBC World Service** (continuous news and current affairs):  
Real Media @ 28.8k  
<pnm://206.190.42.7/bbc288world.ra?StreamID=12386>.  
Real Media @ 14.4k  
<pnm://206.190.42.7/bbc144world.ra?StreamID=12384>.

**RADIO AUSTRIA INTERNATIONAL.** Since Radio Austria's satellite feeds are carried by World Radio Network (WRN), this broadcaster limits its own Internet output to two on-demand programs, Report from Austria and News <<http://www.orf.at/roi/english/welcome.html>>.

**RADIO BULGARIA.** This broadcaster offers a daily six-minute English news program on-demand from their web site <<http://www.nationalradio.bg/real.htm>>.

**RADIO FRANCE INTERNATIONAL.** Each of the three RFI one-hour daily broadcasts in English can be heard via the Internet.  
1200-1300 <pnm://206.161.130.163:7070/rfi/rfi-english1400.ra>  
1400-1500 <pnm://206.161.130.163:7070/rfi/rfi-english1600.ra> to India  
1600-1700 <pnm://206.161.130.163:7070/rfi/rfi-english1800.ra> to Africa

**RTE RADIO ONE.** Ireland's Radio One provides comprehensive coverage of news, sports, lifestyles, features, music, drama and variety, as well as agriculture, education and the topics that shape the nation. Some programs are in Irish. This live, full-time stream is the best way to listen to RTE, which is on shortwave only two hours a day <pnm://streams.tinet.ie/~rte/radio1.ra>.

**RADIO NETHERLANDS.** Internet broadcasts are relayed via World Radio Network (WRN); however, the last three month's editions of their popular DX program "*Media Network*" can be heard on-demand from their web site at <<http://www.rnw.nl/realradio/html/soundstore.html>>.

**RADIO PRAGUE.** The Czech Republic broadcasts in English via the Internet in Real Media at 0800, 1000, 1130, 1230, 1400, 1700, 1800, 2100, 2230, 2330, 0100, 0200, 0400, and 0430 UTC <[pnm://ras.radio.cz/live.ra](http://ras.radio.cz/live.ra)>.

**RADIO SLOVAKIA INTERNATIONAL.** The Slovak Republic's English language service broadcasts via the World Radio Network (WRN). They now provide an on-demand Real Media feed of the news segment of that daily broadcast <[pnm://www.slovakradio.sk/rsi\\_media/ra/en.ra](http://www.slovakradio.sk/rsi_media/ra/en.ra)>.

**RADIO SWEDEN.** Besides relaying its broadcasts via World Radio Network (WRN), Radio Sweden provides its own Real Media feeds. The broadcast you hear via the Internet will depend on the time of day you decide to listen <<http://www.sr.se/rs/english/>>.

**SWISS RADIO INTERNATIONAL.** World Radio Switzerland, although relayed via World Radio Network (WRN), also provides its own 25-minute Internet broadcasts via Real Media <[pnm://194.6.181.36:7070/sri/en/nb/ennca.rm](http://194.6.181.36:7070/sri/en/nb/ennca.rm)>.

**VATICAN RADIO.** Radio Vaticana broadcasts live in five streams via Real Media to different target areas and in different languages. These streams are retransmission of FM broadcasts, some of which are also heard on shortwave. Visit the web site for times, programs, and languages <[http://www.vatican.va/news\\_services/radio/multimedia/live\\_en.html](http://www.vatican.va/news_services/radio/multimedia/live_en.html)>.

**VOICE OF THE MEDITERRANEAN (VOM).** Often erroneously called "Voice of Malta," this island nation has an interesting program lineup. Their shortwave transmissions may be difficult to receive, but you can easily hear their daily one-hour on-demand program via the Internet in Real Media <[pnm://www.nyu.edu/pages/kjc/vom/vom-en.rm](http://www.nyu.edu/pages/kjc/vom/vom-en.rm)>.

## MIDDLE EAST

**ISRAEL RADIO INTERNATIONAL.** The Voice of Israel's 1500 UTC 30-minute English shortwave broadcast can be heard starting at 1920 UTC daily via the Internet <[pnm://usa.wrn.org/kol\\_engl.ra](http://usa.wrn.org/kol_engl.ra)>.

## UNITED STATES OF AMERICA

**KTBN.** The Trinity Broadcasting Network offers three live streams of their television broadcasts in Real Media. These are in both video and audio. These are listed since KTBN shortwave relays these broadcasts. 28.8k Mode: <[pnm://ex4.rbn.com/tbn/tbn/live/trinitylive-20.rm](http://ex4.rbn.com/tbn/tbn/live/trinitylive-20.rm)>. 56k Mode: <[pnm://dc6.rbn.com/tbn/tbn/live/trinitylive-34.rm](http://dc6.rbn.com/tbn/tbn/live/trinitylive-34.rm)>. ISDN Mode: <[pnm://ex3.rbn.com/tbn/tbn/live/trinitylive-80.rm](http://ex3.rbn.com/tbn/tbn/live/trinitylive-80.rm)>.

**VOICE OF AMERICA.** The VOA's shortwave and television output is available on-demand and in many languages. *Communications World* fans can hear the complete 29.5 minute edition. *Talk to America* programs are archived and indexed back to January 1998. English news and feature programs are too numerous to detail in this report. A visit to the VOA website is highly recommended in order to experience the extensiveness of international broadcasting's top webcaster <<http://www.voa.gov/voahome/stremlst.html>>.

**WSHB.** The Christian Science Sentinel Radio Edition website provides

Real Media on-demand of selected religious programs <<http://www.tfccs.com/GV/CSPS/radiosent.html>>.

**WYFR.** Family Radio's "*Sound of the New Life*" can be heard live in Real Media via two of its network stations.

WFSI, Annapolis, MD: <[pnm://real.toad.net/wfsi.ra](http://real.toad.net/wfsi.ra)>.

KEAR, San Francisco, CA: <[pnm://209.219.213.250:7070/family.ra](http://209.219.213.250:7070/family.ra)>.

New G2 KEAR (Stereo): <[pnm://209.219.213.250:7080/encoder/family.rm](http://209.219.213.250:7080/encoder/family.rm)>.

## HOW REALPLAYER WORKS

The RealPlayer is a free download from Real Media's web site at <<http://www.real.com/>>. A deluxe edition is also available there and you will be encouraged to buy the RealPlayer Plus when you visit the site.

Since web browsers do not have the ability to directly open a sound file because of HTML limitations, the browser link to a audio file usually results in the downloading of a "Real" file to your hard drive. The "Real" file is merely a text file that contains instructions to open your RealPlayer and provides the address to connect to. The player then automatically switches between the different audio streams to provide you with the best stream that can be run with your available bandwidth. To get the best possible sound, you should always use the most recent version of the RealPlayer.

Internet shortwave broadcasters do not all use the most recent encoding protocol. If you open the "Real" file (it has a "Real" icon) in a word processor or text editor, you can determine which type of encoding is used. If RSTP (Real Time Streaming Protocol) is at the beginning of the first line of the text, it is the more recent G2-encoded file. If PNM (Progressive Networks Media) is at the beginning of the first line, the file was encoded with an earlier protocol.

RealPlayer provides a means of saving favorite audio links. If the link you save is a pathname to a "Real" file on your hard drive, you must keep the "real" file on your hard drive so that RealPlayer can find it. If you have an internet connection already established, double-clicking on a "real" file can open the RealPlayer which will then make the Internet connection and play the sound file that it represents. No Internet browser is required.

The trouble with this procedure is twofold: (1) the filenames of the "real" files are not very descriptive of the sound source, and (2) you must keep and manage a collection of "real" files on your hard drive. (You can rename the "real" files to make them more understandable and they will still work. If you use a Macintosh, you can drop the extension from the filename.)

Another way to save your favorite audio links is to use the RTSP or PNM address contained in the "Real" text file. Copy it from the "Real" file and paste it into the location field of the RealPlayer. Then save it as a favorite and you can trash the "Real" file that is on your hard drive.





## AUDIO SUBCARRIER GUIDE

By Robert Smathers, roberts@nmia.com

Audio frequencies in MHz. All satellite/transponder coordinates are C-band unless otherwise noted.

DS=Discrete Stereo

### Classical Music

SuperAudio-Classical Collections	G5, 21	6.30/6.48 (DS)
WCPE-FM (89.7) Raleigh/ Durham/Chapel Hill, NC	G5, 7	5.58/6.12 (DS)
WFMT-FM (98.7) Chicago, IL-Fine Arts	G5, 7	6.30/6.48 (DS)
WQXR-FM (96.3) New York, NY	GE4, 14	6.20/6.80 (DS)

### Satellite Computer Services

Superguide	G5, 7	5.48
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### Contemporary Music

SuperAudio-Light and Lively Rock	G5, 21	5.96, 6.12 (DS)
WPHZ-FM (96.9) Bremen, IN (South Bend market)	G11, 15	6.48, 7.30 (DS)

### Country Music

SuperAudio-American Country Favorites	G5, 21	5.04/7.74 (DS)
WSM-AM (650) Nashville, TN	C4, 24	7.38/7.56 (DS)

### Easy Listening Music

FCC mandated safe-harbor program audio-easy listening music	G3R, 9	6.80
	G5, 2	6.80
SuperAudio-Soft Sounds	G5, 21	5.58/5.76 (DS)
United Video-easy listening music	C4, 8	5.895 (N)

### Foreign Language Programming

Antenna Radio (Greek)	GE4, 14	7.80
La Cadena CNN Radio Noticias (CNN Radio News in Spanish)	G5, 17	7.56
Radio Sedaye Iran	GE3, 15	6.16
Radio Tropical	G7, 12	7.60
SRC AM Network	E2, 1	7.38
SRC FM Network	E2, 1	5.41/5.58 (DS)

### Jazz Music

KLON-FM (88.1) Long Beach, CA., ID-Jazz-88	G5, 2	5.58/5.76 (DS)
Superaudio-New Age of Jazz	G5, 21	7.38/7.56 (DS)

### News and Information Programming

Broadcast News	E2, 1	5.78
Cable Radio Network	G5, 2	8.30
	G7, 6	7.30
CNN Headline News	G5, 22	7.58
CNN Radio News	G5, 5	7.58
	G5, 5	6.30
	G5, 22	6.30
WCBS-AM (880) New York, NY-news	T4, 11	7.38

### Religious Programming

Ambassador Inspirational Radio	GE3, 15	5.96, 6.48
Brother Staire Radio	G5, 6	6.48
KHCB-FM (105.7) Houston,	TX	GE1, 9 7.28
LDS Radio Network	C1, 6	5.58
Salem Radio Network	GE3, 17	5.01, 5.20
Trinity Broadcasting radio service	G5, 3	5.58/5.78 (DS)

### Rock Music

SuperAudio-Classical Hits-oldies	G5, 21	8.10/8.30 (DS)
SuperAudio-Prime Demo-mellow rock	G5, 21	5.22/5.40 (DS)

### Shortwave Broadcasters via Satellite

C-SPAN Audio 1: Various shortwave broadcasters	C3, 7	5.20
C-SPAN Audio 2: British Broadcasting Corporation (BBC)	C3, 7	5.41
Deutsche Welle Radio 1	GE1, 22	7.38, 7.56 (DS) (German Language)
Deutsche Welle Radio 2	GE1, 22	7.74 (English Language)
Deutsche Welle Radio 7	GE1, 22	7.92 (Various Languages)
RAI Satelradio Italy (Italian)	G7, 14	7.38
WEWN-Worldwide Catholic Radio, Vandiver, AL	G1R, 11	5.40, 7.20, 7.38 (English), 5.76, 5.58 (Spanish)
WHRA Africa/Middle East-World Harvest Radio, South Bend, IN	G11, 15	7.82
WHRI Americas-World Harvest Radio, South Bend, IN	G11, 15	7.46
WHRI Europe-World Harvest Radio, South Bend, IN	G11, 15	7.55
KWHR Asia-World Harvest Radio, South Bend, IN	G11, 15	7.64
KWHR South Pacific-World Harvest Radio, South Bend, IN	G11, 15	7.73
World Radio Network: WRN1 North America	G5, 6	6.80
World Radio Network: WRN2 North America	G5, 6	6.20 (Multi-lingual)

### Speciality Formats

Aries In Touch Reading Service	C4, 10	7.87
Colorado Talking Book Network	C1, 3	5.60
Los Angeles Kings NHL Radio Network	C1, 7	7.38
SuperAudio-Big Bands (Sun 0200-0600 UTC)	G5, 21	5.58/5.76 (DS)
Weather Channel-background music	C3, 13	7.78
Wisdom Radio Network	GE1, 12	7.10
	GE1, 12	7.92
Yesterday USA-nostalgia radio	G5, 7	6.80

### Talk Programming

American Freedom radio network	GE4, 19	5.80
For the People radio network	C1, 6	7.50
Genesis Communications Radio Network	G1R, 17	5.58
Genesis Communications Radio Network	G9, 2	7.28
Republic Radio International	G7, 14	7.70
Talk America Radio Network #1-talk programs	GE3, 9	6.80
Talk America Radio Network #2-talk programs	GE3, 9	5.41
Talk Radio Network (TRN)	C1, 14	5.80
Truth Radio Network	G9, 2	5.40
TVRO.NET (featuring Keith Lamonica)	GE4, 16	5.80
United Broadcasting Network	C1, 2	7.50
WWTN-FM (99.7) Manchester, TN-news and talk	G5, 18	7.38, 7.56

### Variety Programming

American Urban Radio Network	GE3, 9	6.30, 6.48 (DS)
CBM-FM (88.5) Montreal, PQ Canada-variety/fine arts	E2, 1	6.12
West Virginia Public Radio	GE1, 12	7.74
WNMX-FM (106.1) " Mix 106" Waxhaw, NC	G1R, 17	7.927
WUSF-FM (89.7) Tampa- St.Petersburg, FL (Public Radio)	C4, 10	8.26

# SATELLITE RADIO GUIDE



## FM SQUARED (FM<sup>2</sup>) AUDIO GUIDE

### GE-3 Transponder 17 (C-band)

Blank audio carriers	3.57 MHz
Data Transmission	.80, 1.14, 1.21, and 2.06 MHz
Focus on the Family	1.05 and 1.40 MHz
In-Touch Ministries	4.47 MHz
Salem Satellite Network	4.65, 4.84, 5.01, and 5.20 MHz
SRN News	.33 MHz
USA Radio Network	1.77 MHz

### Galaxy 3R Transponder 3 (Ku-band)

Blank Audio Carriers	2.06, and 3.14 MHz
Data transmissions	.06, .62, 2.93, 3.07 and 3.17 MHz
AP Network News	3.53 MHz
In-Store audio network ads (various companies)	.62, .71, .81, .88, 1.05, 1.15, 1.26, 3.25, 3.44, 3.62, 3.70, 3.80, 3.88, 3.97 and 4.20 MHz
Muzak Services	.15, .27, .39, .51, .98, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, and 4.45 MHz

### Galaxy 3R Transponder 16 (Ku-band)

Data transmissions	.06, .64, 1.95, 2.18, 2.40, 2.52, 2.73, 2.82, 2.92, 3.20, 3.38, 3.47, 3.73, 3.97, 4.14, and 4.24 MHz
In-Store audio networks	.15, .27, .39, .99, 1.11, 1.59, 1.71, and 1.83 MHz

### Telstar 5 Transponder 28 (Ku-band)

Data Transmissions	.06, .15, .23, .30, .35, .38, .47, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, 1.22, 1.35 MHz
--------------------	--

## SATELLITE LOADING REPORT OF THE MONTH

### GE Americom Satcom K2 at 81 degrees West longitude

#### Ku-band

Tr	Freq	Pol	Service
1	11729.0 H		NBC Contract Channel – NBC feeds
2	11773.0 V		NBC Contract Channel – NBC feeds
3	11788.0 H		(none)

4	11821.0 V		NBC Contract Channel – NBC feeds
5	11847.0 H		Data Transmissions
6	11874.0 V		Data Transmissions
7	11921.0 H		(none)
8	11942.0 V		NBC Contract Channel – NBC feeds
9	11970.0 H		NBC Contract Channel – NBC feeds
10	11994.5 V		NBC Contract Channel – NBC feeds
11	12019.0 H		NBC Contract Channel – NBC feeds
12	12067.0 V		(none)
13	12083.0 H		NBC Contract Channel – NBC feeds
14	12117.0 V		NBC Contract Channel – NBC feeds
15	12142.0 H		NBC Contract Channel – NBC feeds
16	12166.0 V		NBC Contract Channel – NBC feeds

### GE Americom GE-2 at 85 degrees West longitude

#### C-band

1	Occasional Video/Digital Video Horse Racing (occ)
2	Occasional Video
3	RAI International (occ)/Occasional Video
4	La Cadena de Milagro
5	NASA Contract Channel
6	Occasional Video
7	Data Transmissions
8	Data Transmissions
9	NASA TV
10	Data Transmissions
11	Data Transmissions
12	Data Transmissions
13	Data Transmissions
14	Data Transmissions/USIA Worldnet

15	Television and VOA Radio (digital) Data Transmissions/Wideband Data Transmissions
16	Data Transmissions
17	Data Transmissions
18	Digital Video Horse Racing (occ)
19	Data Transmissions
20	Occasional Video/Digital Video Horse Racing (occ)
21	Occasional Video/Digital Video Horse Racing (occ)
22	Occasional Video
23	Digital Video Horse Racing (occ)
24	Digital Video Horse Racing (occ)

#### Ku-band

Tr	Freq	Pol	Service
1	11720 V		Primestar (Digicipher 1)
2	11740 H		Primestar (Digicipher 1)
3	11760 V		Primestar (Digicipher 1)
4	11780 H		Primestar (Digicipher 1)
5	11800 V		Primestar (Digicipher 1)
6	11820 H		Primestar (Digicipher 1)
7	11840 V		Primestar (Digicipher 1)
8	11860 H		Primestar (Digicipher 1)
9	11880 V		Primestar (Digicipher 1)
10	11900 H		Primestar (Digicipher 1)
11	11920 V		Primestar (Digicipher 1)
12	11940 H		Primestar (Digicipher 1)
13	11960 V		Primestar (Digicipher 1)
14	11980 H		Primestar (Digicipher 1)
15	12000 V		Primestar (Digicipher 1)
16	12020 H		Primestar (Digicipher 1)
17	12040 V		Primestar (Digicipher 1)
18	12060 H		Primestar (Digicipher 1)
19	12080 V		Primestar (Digicipher 1)
20	12100 H		Primestar (Digicipher 1)
21	12120 V		Primestar (Digicipher 1)
22	12140 H		Primestar (Digicipher 1)
23	12160 V		Primestar (Digicipher 1)
24	12180 H		Primestar (Digicipher 1)

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# NSS 806 International Satellite Workhorse

**T**he International Telecommunications Satellite Consortium (INTELSAT) was originally a quasi-governmental assembly of countries primarily in Europe and the Americas to set standards for world-wide satellite communications. Today INTELSAT operates satellites around the world and specifically in the regions of the great oceans.

In March 1998 INTELSAT approved the creation of an independent company called New Sky Satellites (NSS). A number of satellites were transferred from INTELSAT to NSS, among them Intelsat 806 located at 40.5°W, now known as NSS 806. This satellite bridges the Atlantic region and serves as an international workhorse hauling programming back and forth between Europe and the Americas.

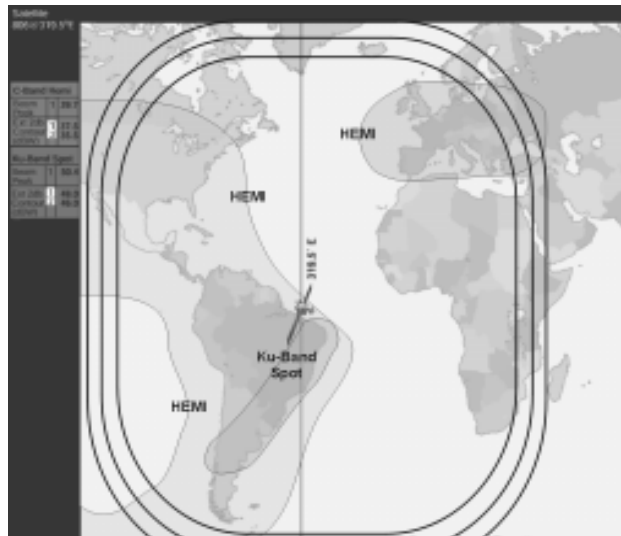
If you were to turn your dish to 40.5° you would be very disappointed to see only one channel in operation: ATC, the national television network for Argentina. You would be additionally dismayed to note that one channel is transmitted in the PAL format used nationally in Argentina. The result of watching a PAL signal on an NTSC (U.S. standard) TV set is that the picture appears as black and white and rolling uncontrollably. At this point you're saying to yourself, "Wait a minute, you call this an international workhorse?"

However, if you were to look at NSS 806 with a digital receiver you would find over 100 channels of video and more than 30 channels of audio services. In fact, it seems that the only reason for having ATC on the bird in analog format is so that it's easy for technicians to locate the satellite. Not a bad idea, considering how hard it is to locate digital-only satellites such as Panamsat 5.

NSS 806 was manufactured by Lockheed-Martin and launched in February 1998. It has 28 C-band and 3 Ku-band transponders and a lifetime of 10 years. The C-band transponders are circularly polarized, as opposed to the U.S. standard linear polarization, and have wide hemispheric beams which cover most of North and South America and the Caribbean. There are only 3 Ku-band transponders, all of which are spot beamed to southeastern South America.

## NSS 806 Line-up

There are more than a dozen countries sending and receiving programming on NSS 806 ranging from Brazil to Venezuela and France to the U.S.A. Audio services range from Metropolitan Opera relays to Radio Italia. While a third of the channels are encrypted, most are in the MPEGII Free-To-Air (FTA) mode. And, while it's not possible to



view the encrypted channels without using an authorized decoder, the other channels may be viewed with an inexpensive MPEGII receiver such as the unit reviewed in last month's issue.

Argentina has a package of MPEGII channels including TV Argentina, RAI International (from Italy), and Solo Tango (the dance pride of the Argentine). Audio services include RAI International, Radio FM Cumbia, Radio Panda, FM News, and Radio 10. The analog ATC channel also features Radio Nacional Argentina on an analog subcarrier at 7.00 MHz while audio for the video service is found at 6.40 MHz.

Bolivia has a package of services including ATB Red Nacional (national network), Unitel, Red Uno de Bolivia, PAT, Sitel, Canal 18 TV Catolica and TVB Internacional. Radio services are Radio Panamericana and Radio Sol.

Colombia has seven video services and no extra audio services. The national network RCN TV is carried as well as Cadena Uno, Canal A, Senal Colombia, and three

other regional channels.

Venezuela has five video services including Venezolana de TV, Globovision, Marte TV, Puma TV and Meridiano TV. On the radio side you can hear Radio Capital 104.5 FM, Radio Popular, and Radio Nacional de Venezuela.

The package of programs from Brazil are all encrypted as are some 25 other channels.

The package from the U.S. Information Agency including WorldNet Europe and WorldNet Latin America & Africa are FTA, including the audio services of The Voice of America, VoA Music Mix and VoA News Now, services intended for station affiliates in Europe, Africa and the southern Americas.

Other channels of interest include Canal Sur, a Miami based programmer which retransmits the more popular video programming from broadcasters all over Latin America. In addition, they transmit the radio service Radioprogramas del Peru.

The most intriguing channel package includes the Syria Satellite Channel, Muslim TV, Fashion TV, MCM Europe, and Video Italia. Fashion TV is direct from Paris and features a non-stop flow of *haute couture* fashion without commentary, but lots of upbeat music. They also air some of the wildest programming anywhere, including live feeds from Brazil on the night of *Mardi Gras*. For some reason you won't see that anywhere else. The European rock music on MCM Europe is unsurpassed. Audio programming in this package includes Syrian Radio, Radio Italia, Radio Dimensione Suono and several channels of Radio France International.

One of the more interesting radio services is the Metropolitan Opera service which, when not actually transmitting the Met or operatic arias and overtures, retransmits the audio of the U.S. Naval Observatory time signal station.

## How To Tune In

As mentioned earlier, there are some peculiarities to this satellite which make it harder to receive than most in our area of the Clarke Belt. However, there are so many interesting things to see and hear on this bird that it's worth the effort.



*Modified Teflon insert in throat of a C/Ku-band feed horn is the cheapest way to receive circularly polarized C-band signals and doesn't degrade linear C or Ku-band reception. (Courtesy author)*

The first thing you'll notice is that at 40.5°W, this satellite is considerably east of your actuator arm's limit. However, if you have a horizon-to-horizon mount or a 36-inch linear actuator arm you'll have no difficulty getting to this satellite. Even so, if you're willing to do some experimenting, you can still view this satellite without special actuator capabilities. To do this you'll need the help of a friend and some hand tools.

With the dish looking at your westernmost satellite, take a permanent marker and mark both sides of the actuator clamp. Have your friend support the dish while you loosen the actuator arm clamp that holds the actuator arm to the dish mount. Once loosened, rotate the dish east by sliding it up the actuator arm as far as you can. Having marked the position, you can safely return the arm to its original position without having to realign the dish. Now, tighten the clamp. The receiver thinks it's still looking at the westernmost satellite, but in actuality it's several satellites east.

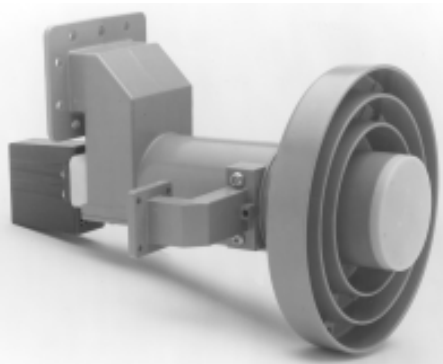
Now, set your analog receiver to channel 23 and press the "east" button on your remote to move the dish east. Watch for ATC, which will eventually heave into view as you come across NSS 806. Peak it for best signal. To return the dish to normal, simply send it back to the westernmost satellite. Once there, unloosen the clamp and slide it down to the marks you made earlier and retighten.

Without the aid of a commercially made, international feed horn (see photo #2) you'll experience considerable signal loss trying to view the satellite with a linearly polarized feed horn. A simple Teflon insert can be placed in the throat of the feed horn to cause the circularly polarized signals to become linear so that you can switch between left hand and right hand circularly polarized channels with your horizontal/vertical feed horn. The insert is available from Skyvision for under \$20. If you're using a C/Ku-band feed horn you'll need to do additional modifications to allow it to fit properly (see photo #1).

Everything is a trade-off and while the insert is cheap, it doesn't do as well as the real

thing, but then, the real thing is very expensive. But, if you're just getting into satellite TV and want to make international satellite reception a big part of your viewing, consider getting the ADL RP3-CKU – a C/Ku-band international feed made by ADL and also sold by Skyvision for \$260.

NSS 806 has transponder output similar to most new satellites in our region of the



*ADL RP3-CKU international C/Ku-band feed horn has capabilities to receive linear and circularly polarized C-band signals and is characterized by extra length in the C-band wave guide and built-in Teflon inserts. Provides better performance over simple insert. (Courtesy ADL)*

Clarke Belt, but, because the beam is spread over the entire western hemisphere and the satellite is so far to the east, it will be difficult to view from U.S. locations west of the Mississippi. A ten foot dish is a must, and the lowest possible noise temperature LNB will help.

Next up for New Skies in the Atlantic region will be the launch of NSS-7 now under construction at Lockheed Martin. This combination C/Ku-band satellite will take the place of Intelsat K and Intelsat 803, both currently co-located at 21.5 degrees west. Intelsat K will be near the end of its life expectancy by the time NSS-7 is launched in the third quarter of 2001. The higher power of NSS-7 should make it easier to receive with standard 10 foot dishes.

## RESOURCES

For complete details on NSS 806 including full channel line-up and your dish positioning parameters see [www.lyngsat.com/nss806.shtml](http://www.lyngsat.com/nss806.shtml).

To order a Teflon insert or the ADP RP3-CKU International feed call Skyvision at 800-500-9275 or visit their web site at [www.skyvision.com](http://www.skyvision.com).

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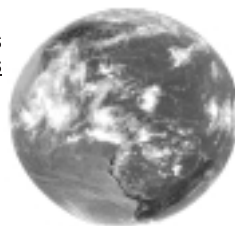
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*Image captured with Apt. Dwellers system*

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# View from the Top of the Century

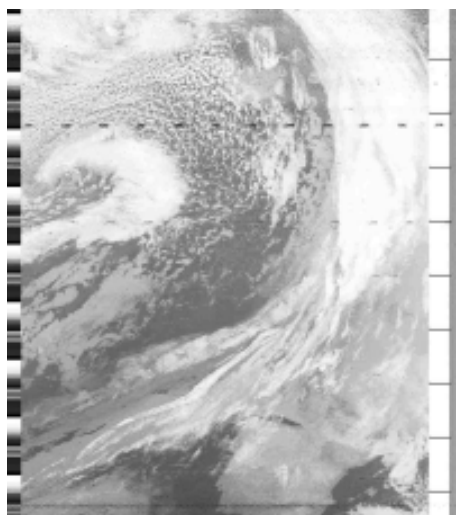
## KEY

APT	automatic picture transmission
GOES	Geostationary Operational Environmental Satellite
HRPT	high resolution picture transmission
NOAA	National Oceanic and Atmospheric Administration
WXSAT	weather satellite

As the century ended, NOAA-12's automatic picture transmission (APT) was temporarily switched on for a few hours on 137.62 MHz. For a brief period between December 31, 1999/January 1, 2000 (on orbit 44,825), at approximately 1430 UTC, NOAA-12 provided APT for about four orbits before being turned off (on orbit 44,829) at approximately 2055 UTC.

As NOAA's Wayne Winston explained: "This choice of orbits permits APT coverage while the satellite is southbound over the Pacific Ocean and crossing over the International Date Line from an area where the local date is December 31, into the area where the local date is January 1. Because of the orbital parameters of the active NOAA satellites, this will permit the first available NOAA APT imagery in the year 2000 just west of the Date Line – primarily New Zealand and Australia."

The frequency was selected to avoid a VHF clash (on 137.50 MHz) with NOAA-15.



*Fig 1: NOAA-12 on 137.62 MHz at 1729 UTC north-bound across Spain, France and Britain*

## Non-APT operational WXSATS

The National Oceanic and Atmospheric Administration (NOAA) provide a considerable amount of information, via the internet, concerning background operations on all serving NOAA WXSATS, not just those transmitting APT. This provides an opportunity to monitor some of the other transmissions in the 137 MHz band. Although NOAA-11 is not providing APT transmissions, its beacon can usually be heard on 137.77 MHz, except during times when passes coincide with NOAA-14.

As well as monitoring APT transmissions using a PROscan WXSAT receiver, I do a considerable amount of general scanning of this and nearby bands using an Icom R8500 receiver fed by a log periodic antenna. Following a week or two of non-operation in early December 1999 due to a problem with my mast, I was finally able on December 17 to hoist the antenna and start the scanner. To my surprise, I picked up coincident (non-APT) transmissions on 137.50 and 136.77 MHz not related to NOAA-14 or NOAA-15.

Checking the positions of all NOAA satellites, the times were found to coincide with NOAA-9. The same transmissions were also logged during later passes of the satellite.

The mast problem? It is hinged at the base and welded to a tall washing post support. A long cord connected to the top of the mast runs through a pulley on the post and back to ground level in order to lower or raise it. The wind blew the too-short cord through the pulley while the mast was down: I had to wait for a friend with a long ladder to come along and re-thread it!

## Operational WXSATS

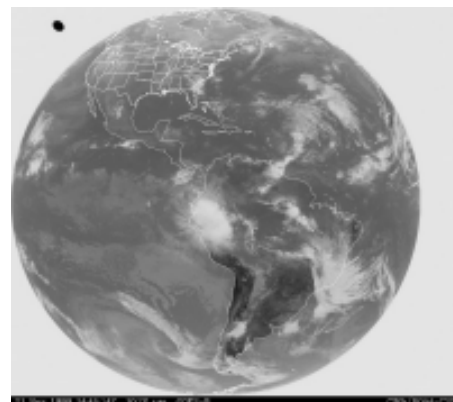
NOAA-14, NOAA-15, Meteor 3-5 and Resurs-01-N4 provide regular APT, and in addition to these two NOAAs, NOAA-12 and Feng-yun 1C also provide high resolution pictures. Unlike the NOAAs, Meteor and Resurs transmit in sunlight only, although we get a little extra from Resurs in the form of an "early" switch-on shortly before entry into sunlight.

## GOES "captures" the moon

A friend of mine told me that a group of UFO "enthusiasts" were circulating a GOES image said to prove the existence of UFOs. After a few seconds' thought and without even looking at the picture, I knew what was under discussion! Unlike METEOSAT (the operators of which mask out any non-disc feature from the images, as well as encrypt them), images

from GOES are provided "as is," and sometimes include the Moon.

It is possible to accurately simulate the view from GOES using a planetarium-type program; the occasional "lunar intrusion" is fully predictable and demonstrates – on infra-red images – heat radiated by the moon.



*Fig 2: GOES-E image from November 21, 1999 showing the moon*

## DMSP launch check-out moves to NOAA

A significant move towards civilian operations formed part of the post-launch schedule for the latest Defense Meteorological Satellite Program (DMSP) satellite launched December 13, 1999. Lockheed Martin Missiles & Space (LMMS), headquartered in Sunnyvale, California, built the DMSP Block 5D-3 spacecraft under contract to the U.S. Air Force, and the Denver, Colorado-based Lockheed Martin Astronautics provided the booster.

The Air Force Space and Missile Systems Center at Los Angeles Air Force Base manages the DMSP and Titan programs. The satellite was launched by the U.S. Air Force and will be operated by the Commerce Department's National Oceanic and Atmospheric Administration.

"This is the first DMSP whose post-launch checkout is being conducted from NOAA's Satellite Operations Control Center in Suitland," said NOAA's John Cunningham, who heads the office responsible for combining the nation's civilian and military polar-orbiting environmental satellite programs. The merger of these programs, expected to save U.S. taxpayers \$1.8 billion, was directed by President Clinton on May 5, 1994.

Last year, as part of the merger designed to promote efficiency and cut down public ex-



pense, the Air Force transferred control of its weather satellites to NOAA and closed its 6th Space Operations Squadron at Offutt after nearly 35 years of continuous operations. The Air Force Reserve now operates a backup DMSP command and control facility at Schriever Air Force Base, Colorado.

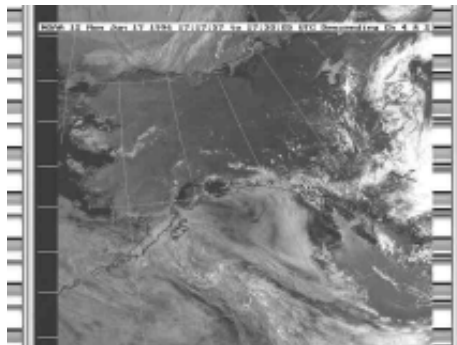
NOAA's Suitland facility is now the primary location for providing functions associated with command and control of all U.S. weather satellites, including early orbit check-out following launch operations, satellite state-of-health maintenance, and satellite sensor and payload management. It operates two of its own civilian polar-orbiting satellites, NOAA-14 and NOAA-15, and also the nation's geostationary environmental satellites, GOES-8 (overlooking the East Coast and well out into the Atlantic Ocean), and GOES-10 (overlooking the West Coast and well out into the Pacific Ocean, including Hawaii). NOAA has been operating five DMSP satellites since May 1998.

DMSP program director Air Force Colonel Jeff Quirk explained "DMSP satellites are used for strategic and tactical weather prediction to aid the U.S. military in planning operations at sea, on land and in the air. The satellites are equipped with sophisticated sensors that can image cloud cover and general weather effects in both visible and infrared, and collect specialized meteorological, oceanographic and solar-geophysical information under all weather conditions." In addition, DMSP provides a unique microwave imaging capability not found on any other operational weather satellite.

The DMSP program office, under the Air Force Space and Missile Systems Center, designs, builds, launches, and maintains several near-polar orbiting, sun-synchronous satellites. DMSP satellites orbit at an altitude of approximately 830 km above the Earth. Each satellite crosses every point on the Earth at least twice a day and has an orbital period of about 101 minutes. The DMSP constellation provides nearly complete global coverage of clouds and other meteorological and oceanographic data every six hours.

Early this century, DMSP and NOAA polar-orbiting satellites will converge into a combined system, known as the National Polar-

orbiting Operational Environmental Satellite System, or NPOESS. NPOESS launches should begin in about 2008, after NOAA and the Air Force have both exhausted the satellites currently in the "pipeline."

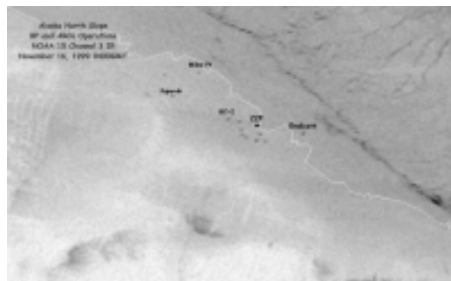


**Fig 4: NOAA-12 APT image of Alaska, June 1996 from Dick Mobley**

### Correspondence

Dick Mobley was employed by British Petroleum as a telecommunications technician for 21 years. Like many such hobbyists, Dick's first APT station was homebrew from the ground up. He built the antenna, receiver, demodulator and – unusually – wrote the display software.

I have seen few APT images of the Alaskan region, so this one from NOAA-12 was of great interest. Dick has superimposed lines of longitude and country outlines to aid identification of features. Great Bear Lake in the Northwest Territories of Canada is clearly seen near upper right.



**Fig 5: North slope in Alaska November 16, 1999, at 0400 UTC from Dick Mobley**

After several years fighting wires around the shack, Dick gave in and bought a commercial system. He decided to upgrade to HRPT, and the "ready-built" route won with ease. He assembled a high-resolution-picture-telemetry (HRPT) system during fall because he wanted to see if an infrared signature was visible from their oil production facilities.

The HRPT system is by Timestep and uses a 3 foot dish. He e-mailed an image showing the northern coast of Alaska – see figure 4.

Figure 5 is from NOAA-15 and was received on November 16, 1999. The picture shows BP and ARCo operations. Dick tells me that the southwest area of Prudhoe Bay is marked

by CCP, a gas injection facility. The northern coast of Alaska is often covered with low clouds, but on good WXSAT passes many lakes are also visible.

The station was assembled in November, long after the best solar illumination had passed. The HRPT system was able to see the long (60+ miles) shadows cast by Mount McKinley. Dick also reports minor earthquake activity around the area, and says that in the past, volcanic activity has not been far behind. He looks forward to the longer days and what the visible channels will then show.

### FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz  
NOAA-15 transmits APT on 137.50 MHz  
NOAAs transmit beacon data on 137.77 or 136.77 MHz  
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight  
Resurs 1-4 transmits APT on 137.85 MHz  
Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz  
GOES-8 and GOES-10 use 1691 MHz for WEFAX



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**Fig 3: DMSP satellite – artist's impression. Picture courtesy Lockheed Martin Missiles & Space.**

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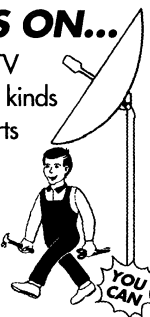
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# Mysterious Data Signals in New England

I recently received some interesting correspondence from Bill Dunn in Massachusetts asking about the various data signals he has monitored coming from airports in the New England area in the 406-412 MHz portion of the spectrum. Dunn wants to know what these signals are being used for?

Bill provides the *Fed Files* with the following list he has monitored. Based on the research I have been able to piece together, the majority of the data frequencies listed are used for remote monitoring of various aspects of the instrument landing systems (ILS) at the airports listed. Of course, two of the listings are for the AWOS (Automated Weather Observing System) and ASOS (Automated Surface Observing System) data systems.

Thanks for the input, Bill, and check back often.

408.000 Boston, MA (LWM Lawrence Muni ILS monitoring system-LVH)  
408.425 Nashua, NH (ASH Boire Field Airport ILS monitoring system-LVH)  
408.825 Manchester, NH (I only show an AWOS data link at Keene Airport here-LVH)  
409.600 Bedford, MA (USAF Base) (BED Hanscom Field ILS monitoring system-LVH)

409.800 Norwood, MA (I do not show this airport on this frequency-LVH)  
409.850 Provincetown, MA/Manchester, NH (I show OWD Norwood Memorial ILS monitoring system here, but not the two airports listed-LVH)  
410.000 Hyannis, MA (PVC I show Provincetown ILS monitoring system-LVH)  
410.075 Plymouth, MA/Manchester, NH/Taunton, MA (This frequency is used extensively for integrated data collection platforms for the national weather service at the airport listed here as well as others nationwide. These are called ASOS systems-LVH)

410.950 Boston, MA (I do not show this airport on this frequency-LVH)  
413.600 Worcester, MA (I show a low level wind shear alert system at Logan Airport and an ILS monitoring system at New Bedford on this frequency-LVH)  
416.875 Laconia, NH (LCI Laconia Muni ILS monitoring system-LVH)

## Wildfires in the Southeast

Here in the mountains of western North Carolina we have been suffering through one of the driest falls on record. This unfortunately led to an outbreak of wildfires during the late fall. Once these fires got out of hand, additional assets were requested to help combat the problem. With that help came some additional frequencies associated with the fire fighting effort. Table one below is a list of the frequencies we monitored during the recent crisis.

Also this month we continue our exploration of the VHF high government frequency band, started in the December 1998 issue of the *Fed Files*, by profiling the 170.0-170.9875 MHz range in Table 2.

So load up those scanners and let us know what you are hearing in the federal bands. Until next month, good hunting.



**Table One: United States Forest Service (Selected Southeastern US)**

### Chattahoochee National Forest, GA

168.625 Simplex Air net simplex  
168.775 Simplex Fire ground/talk-around  
168.775/168.175 Forest link [Various locations]  
411.225 and 415.225 Forest UHF link [Glassy Mountain to Chatsworth]  
411.275 and 415.275 Air net UHF link [Brasstown Bald to Atlanta/Gainesville]  
411.325 and 415.325 Forest UHF link [Black Mountain to Dahlonega, Chenocetah to Clarksville, Johns tower to Lafayette]  
411.425 and 415.425 Forest UHF link [Brawley Mountain to Blue Ridge and Glassy Mountain to Clayton]  
411.475 and 415.475 Forest UHF link [Brasstown Bald to Gainesville/Blairsville] (136.5 Hz)  
171.975/168.150 Forest rangers [Various locations]

### Cherokee National Forest, TN

1610 kHz Oconee-Cherokee National Forest  
Traveler Info Service  
168.025/172.400 Law enforcement <LE-8> (123.0 Hz)  
168.650 Simplex KID313 Cherokee air safety net -- Air-to-air, air-to-ground and flight following  
169.875/168.075 Forest rangers north units  
169.925/166.675 Forest rangers south units (103.5 Hz)

### Nantahala National Forest, NC

171.475 Simplex Forest range talk-around <Channel 1>  
171.475/168.125 Forest rangers [Fain Mountain to Johanna Bald] <Channel 2> (103.5 Hz)  
168.350 Simplex Forest rangers fire ground <Channel 4>  
169.900 Simplex Car-to-car/Helicopter/Air-to-ground/Fire ground <Channel 3>

### Pisgah National Forest, NC

168.725 Simplex Forest rangers (Talk-around) <Channel 1>  
168.725/172.225 Forest rangers <Channel 2>

### US Forest Service Miscellaneous

122.925 Simplex US Forest Service air net: firefighting aircraft helicopters/fixed wing)  
123.075 Simplex US Forest Service air net: Helicopters  
166.675 Simplex National Interagency Fire Center/National Incident Radio Support Cache (NIFC/NIRSC) <Air tactics 1> (Air-to-air)  
168.100/170.450 NIFC/NIRSC <Command 2>  
168.075/170.425 NIFC/NIRSC <Command 3>  
169.125 Simplex North Carolina forestry statewide  
168.025 repeater out US Forest Service law enforcement nationwide (input unknown)

**Table Two: Federal Frequency Allocations: 170-170.9875 MHz**

170.0000	Agriculture Department (Nationwide), Animal and Plant Health Inspection Service, Bureau of Prisons, Bureau of Reclamation, Federal Law Enforcement Training Center, Forest Service, NASA, National Park Service, Secret Service (Juliet)	170.3250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.5625	(No reported activity)
170.0125	(No reported activity)	170.3375	(No reported activity)	170.5750	Air Force, Army, DEA, Energy Department, Forest Service, NASA, National Park Service, Navy, Post Office, State Department, United States Courts, Veterans Administration
170.0250	Army, Bureau of Land Management, Energy Department, FBI, Fish and Wildlife Service, Interior Department (Nationwide), NASA, National Park Service, TVA, Veterans Administration	170.3500	Air Force, Army, Energy Department, FBI, Forest Service, Interior Department, NASA (Nationwide), National Park Service, National Science Foundation, Post Office, Veterans Administration	170.5875	(No reported activity)
170.0375	(No reported activity)	170.3625	Interior Department (Nationwide)	170.6000	Agriculture Research Service, Air Force, Army, Bureau of Prisons, Bureau of Reclamation, Corps of Engineers, Energy Department, FBI, Federal Law Enforcement Training Center, Food and Drug Administration, Forest Service, Navy, Post Office, Soil Conservation Service, Veterans Administration
170.0500	Bureau of Land Management, FBI, Fish and Wildlife Service, Forest Service, Interior Department (Nationwide), National Park Service, TVA	170.3750	Air Force, Army, Bureau of Mines, Bureau of Reclamation, Corps of Engineers, Energy Department (Nationwide), EPA, FBI, FCC, Forest Service, General Services Administration, Geologic Survey, House of Representatives, NASA, Navy, Post Office, Veterans Administration	170.6125	(No reported activity)
170.0625	(No reported activity)	170.3875	Interior Department (Nationwide)	170.6250	Bureau of Prisons, FBI, Immigration and Naturalization Service (Nationwide)
170.0750	Bureau of Indian Affairs, Coast Guard (District 1), Energy Department, Interior Department (Nationwide), National Park Service	170.4000	Air Force, Army, Energy Department, EPA, FAA, NASA, Post Office, Veterans Administration	170.6375	(No reported activity)
170.0875	(No reported activity)	170.4125	(No reported activity)	170.6500	Air Force, Bureau of Prisons, FBI, Immigration and Naturalization Service (Nationwide)
170.1000	ATF, Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Customs Service Park Service, National Weather Service	170.4250	Agriculture Department (Nationwide), Bureau of Land Management, FBI, Federal Law Enforcement Training Center, Forest Service, Soil Conservation Service	170.6625	(No reported activity)
170.1125	(No reported activity)	170.43125	Forest Service	170.6750	FBI and Immigration and Naturalization Service (Nationwide)
170.1250	Air Force, Army, Energy Department, EPA, FBI, Forest Service, Indian Health Service, NASA, Navy, Post Office, Veterans Administration	170.4375	Forest Service	170.6875	Air Force and Immigration and Naturalization Service (Nationwide)
170.1375	Army	170.44375	Forest Service	170.7000	FBI, Forest Service, Immigration and Naturalization Service (Nationwide)
170.1500	Air Force, Army, Civilian Fire Departments, Energy Department, FAA, FBI, Forest Service, Navy, Post Office, TVA, Veterans Administration	170.4500	Agriculture Service (Nationwide), Animal and Plant Health Inspection Service (Nationwide), Bureau of Land Management, FBI, Forest Service, State Department	170.7125	(No reported activity)
170.1625	(No reported activity)	170.45625	Forest Service	170.7250	Energy Department, FAA, FBI, Immigration and Naturalization Service (Nationwide)
170.1750	Air Force, Army, Energy Department, Federal Reserve System, Forest Service, Marine Corps, NASA, Navy, Post Office (Postal Inspectors), Smithsonian Institute, Veterans Administration	170.4625	Forest Service	170.7375	(No reported activity)
170.1875	(No reported activity)	170.46875	Forest Service	170.7500	Energy Department, FBI, Forest Service, Immigration and Naturalization Service, Marshal Service, NASA, Railroad Transportation Test Center
170.2000	ATF, Commerce Department (Nationwide), Corps of Engineers, Customs, Environmental Research Lab (Nationwide), FAA, Geologic Survey, NASA, National Ocean Service, National Weather Service, Navy, NOAA (Nationwide), Veterans Administration	170.4750	Agriculture Department (Nationwide), Agriculture Extension Service, Agriculture Research Service, Animal and Plant Health Inspection Service, Food and Inspection Service, Forest Service, Geologic Survey, Soil Conservation Service, Virginia State Forestry Service, Wisconsin State Forest Conservation Service	170.7625	Immigration and Naturalization Service
170.2125	(No reported activity)	170.48125	Forest Service	170.7750	FBI, Immigration and Naturalization Service (Nationwide), Post Office
170.2250	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.4875	Forest Service	170.7875	(No reported activity)
170.2375	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.49375	Forest Service	170.8000	Marshal Service (Nationwide)
170.2450	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power	170.5000	Agriculture Department (Nationwide), Air Force, Animal and Plant Health Inspection Service, FAA, FBI, Forest Service, Navy, NOAA Aircraft Operations Center, Post Office, Soil Conservation Service	170.8125	(No reported activity)
170.2500	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.50625	Forest Service	170.8250	Coast Guard, FBI (Nationwide), Soil Conservation Service (Nationwide)
170.2625	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.5125	Forest Service, Interior Department (Nationwide)	170.8375	(No reported activity)
170.2750	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.51875	Forest Service	170.8500	FBI and Marshal Service (Nationwide)
170.2875	(No reported activity)	170.5250	Agriculture Department (Nationwide), Agriculture Research Service, Animal and Plant Health Inspection Service, Food Safety and Inspection Service, Forest Service, Geologic Survey, Soil Conservation Service	170.8625	(No reported activity)
170.3000	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.53125	Forest Service	170.8750	Bureau of Prisons, FBI, Marshal Service (Nationwide), Navy
170.3050	Low power, wireless microphones up to 54 kHz bandwidth, 50 milliwatts maximum power	170.5375	Forest Service	170.8875	(No reported activity)
170.3125	Hydrologic Channel (center frequency): US Government/Non-Government Agencies	170.54375	Forest Service	170.9000	DEA, FBI (Nationwide), Post Office
		170.5500	Agriculture Department (Nationwide), Agriculture Research Service, Bureau of the Mint, Bureau of Prisons, FBI, Fish and Wildlife Service, Forest Service, Soil Conservation Service, Transportation Department	170.9125	(No reported activity)
				170.9250	Bureau of Prisons (Nationwide), FBI (Nationwide), Marshal Service
				170.9375	(No reported activity)
				170.9500	FBI (Nationwide)
				170.9625	(No reported activity)
				170.9750	Agriculture Department (Nationwide), Bureau of Land Management (Nationwide), Federal Law Enforcement Training Center, Federal Reserve System, Forest Service
				170.9875	(No reported activity)

# Tracking Motorola Systems

The most common trunked radio systems in use by public safety agencies in the United States are those manufactured by Motorola. This month we'll briefly review the different systems and go into more detail with each one in the coming months.

Broadly speaking, there are four main types of Motorola systems. They are Type I, Type II, Type I/II hybrids, and ASTRO. With the exception of ASTRO, voice transmissions in these systems are analog, meaning you can hear them on a regular scanner.

## Motorola Type I

Type I is a first generation trunking system that operates only in the 800 MHz range. You may also run across the phrase "Privacy Plus," which started out in life as a Motorola marketing term for a Type I system.

Type I systems are somewhat more confusing to a beginning listener because of the way talk groups are assigned. As you may recall from previous columns, conventional (non-trunked) two-way radio creates talk groups by assigning a different radio frequency to each group of users. In trunked radio systems, a small set of radio frequencies is shared among a number of groups, with each group having their own "talk group" identifier.

In a public safety system, for example, a city may have the police department in one talk group, the fire department in another talk group, and the streets and sanitation department in a third talk group. These talk groups are distinguished by digital codes that the radios transmit and receive.

## Fleets and Subfleets

Type I systems are organized into a hierarchy of fleets, subfleets, and users. Each fleet is made up of several subfleets, and each subfleet in turn is made up of individual radio identifiers. A fleet is usually a group of subfleets that all work for the same organization, like a police or fire department. Each of those subfleets is made up of individual users who have the same kind of job and don't usually need to talk to other subfleets. Within

a police department fleet, for instance, you may have patrol, detective, and traffic subfleets, and each of those subfleets will be made up of individual officers.

Each Type I system has a fixed number of fleets, subfleets, and radio identifiers. Some users may need many fleets with just a few subfleets and numerous individual radios, while others may require just one fleet with many subfleets and a handful of individual radios. Type I system designers must plan for growth in the beginning, since the number of identifiers any fleet or subfleet can support is limited and the selections are not easily changed once a system is running.

## Radio Addressing: Type I

Radios in any trunked system have a digital "address" that uniquely identifies them and are held in a part of the radio called a "code plug." Addresses are part of what mobile radios and repeaters transmit, and what trunk-tracking scanners decode.

Address information in a Type I system is broken up into eight blocks, numbered zero through seven. Each block is assigned a "size code" that determines how many fleets, subfleets, and individual radio identifiers can be supported in that block.

For instance, a block with a size code of S-2 can support, at most, 16 fleets, 8 subfleets per fleet, and 64 individual radio identifiers per subfleet. Size codes S-12, S-13, and S-14 are special in that they take up more than one block. S-12 uses two blocks, S-13 uses four blocks, and S-14 takes up all eight blocks.

## Maximum Values for Type I Systems

Motorola Size Code	Uniden Size Code	Fleets	Subfleets	IDs
A	S-0	(used with Type II systems)		
B	S-1	128	4	16
C	S-2	16	8	64
D	S-3	8	8	128
E	S-4	1	16	512
F	S-5	64	4	32
G	S-6	32	8	32
H	S-7	32	4	64
I	S-8	16	4	128
J	S-9	8	4	256

K	S-10	4	8	256
L	S-11	2	16	256
M	S-12	1	16	1024
O	S-13	1	16	2048
Q	S-14	1	16	4096

A "fleet map" is the size code for all eight blocks. The combination of block, fleet, subfleet, and radio identifier is a Type I address that uniquely identifies a radio.

## Scanning Chicago's O'Hare Airport

The Command Center at O'Hare International Airport in Chicago uses a Type I trunking system for a variety of ground operations, including security, fire, and parking. They are assigned seven radio frequencies: 856.7625 857.7625 858.7625 859.7125 859.7625 860.7125 860.7625 MHz.

Trunk-tracking scanners come with a number of preprogrammed fleet maps. For O'Hare, the fleet map that seems to work well is E1P4, which looks like this:

Block	Size Code
0	S-12
1	—
2	S-4
3	S-4
4	S-4
5	S-4
6	S-4
7	S-4

Blocks 0 and 1 are used by S-12, which supports one fleet with sixteen subfleets and 1024 unique radio identifiers. Assignments of each subfleet, as reported by listeners, is as follows:

Fleet	Subfleet	Assignment
000	01	Dispatch
000	02	Trades
000	03	Electrical
000	04	HR
000	05	Construction
000	06	Parking
000	07	Ground Transportation
000	08	F 100
000	09	Police
000	11	Fire

000	12	Operations
000	13	Security
000	14	Emergency
000	15	Aircraft Rescue and Fire Fighting
000	16	Accident Control

## Motorola Type II

Type II systems are the second generation of Motorola trunking technology, which they sell under the trademark "SmartNet." These systems operate in the 800 MHz, 900 MHz, VHF, and UHF bands and provide emergency signaling, enhanced security, remote monitoring, and more flexible grouping options. Type II systems can have, at most, 28 radio channels and 4000 talk groups, but the most significant difference to a radio listener is the change in how radios are addressed.

Type II radios use two different types of addresses, a radio identifier and one or more talkgroup codes. Every radio in the trunked system has assigned to it a unique, individual identifier. Every talkgroup also has a unique identifier, designated by a hexadecimal code.

A radio may be added to a talk group by simply adding the corresponding hexadecimal code to the radio. Because radio identifiers are separate from talkgroups, there is no need to reprogram every radio in the system and no limit to the number of radios that can participate in a talkgroup.

## Scanning Disneyland

Disneyland amusement park in Anaheim, California, is reported to use a Type II system for security and park operations. I've gotten one report that they use five frequencies in the 800 MHz band, namely 861.5125 862.5125 863.5125 864.5125 and 865.5125 MHz, but the more likely frequencies are 938.3875 938.4000 938.4375 938.4500 938.4625 938.4750 938.4875 and 938.5000 MHz. The Anaheim Police Department is supposed to have a patch into the system as well. Can anyone confirm the proper frequencies and talkgroups?

Type II systems may also be linked together to form a "SmartZone" (another Motorola marketing term). As many as 48 sites can be interconnected using microwave or landline links to provide communications over a wide area. Mobile radios transmit to the nearest site but can participate in a talkgroup with other radios operating through other sites.

## Motorola Type I/II Hybrid

A hybrid system contains a mixture of

Type I and Type II radios. It is often used by an organization that is transitioning to a Type II system, but wants to keep using their old Type I equipment.

Hybrid systems can be confusing to trunk-tracking scanner listeners, since the received signal may contain both talkgroups and fleet/subfleet addresses.

## Scanning Arlington, Texas

The city of Arlington, Texas, uses a hybrid system on the following eight radio frequencies: 856.4875 856.7125 857.4875 857.7125 858.4875 858.7125 859.4875 859.7125 860.4875 and 860.7125 MHz.

The appropriate fleet map for Arlington looks like:

Block	Size Code
0	S-4
1	S-11
2	S-12
3	—
4	S-11
5	S-0
6	S-0
7	S-0

The fire department uses Type I fleet addresses beginning with 100 and the police use Type I fleet addresses beginning with 200. Other services use fleets 000 and 101. The University of Texas at Arlington shares the system and uses several talkgroups with Type II addressing.

## Motorola ASTRO

ASTRO is a Motorola trademark for their line of digital voice radios. An ASTRO system is similar in concept to a Type II system except that a user's voice is transmitted in digital rather than analog form. This means that scanners on the market today cannot decode the voice portion of the conversation.

ASTRO is Motorola's answer to APCO Project 25. The Association of Public Safety Communications Officials (APCO) began Project 25 to produce a set of technical standards for land mobile radios. These radios are designed meet the needs of public safety users and allow maximum interoperability between different jurisdictions, including local, state, and federal government agencies.

These standards are open and available to the public, although the complete printed set of documents is rather expensive (more than \$2500). The most annoying part of the standard as far as scanner listeners are concerned is the digital voice transmissions. Look for

more information on that subject in a future column.

Large municipalities, such as Cleveland, Ohio, and San Diego County, California, are the main customers for ASTRO. Several statewide systems are also in operation, including Florida, Massachusetts and Michigan.

One of the more recent conversions to ASTRO is the city of Baltimore, Maryland. Their \$65 million system came on-line last November with 28 channels and nine simulcast sites. More than 5,000 mobile and portable radios are using the 800 MHz system.

Last July the city of Philadelphia signed a \$51 million contract for two 15-channel ASTRO systems linked via SmartZone. More than 6,000 radios are expected to operate over their system.

That's all for this month. I welcome your comments, questions, frequency lists and talkgroup information via electronic mail at [dan@decodesystems.com](mailto:dan@decodesystems.com). You can also check my website at [www.decodesystems.com](http://www.decodesystems.com) for more information on wireless communication.

Until next time, happy monitoring!

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# Business: Railroad Allocations

In this month's *Service Search* column we will start taking an in-depth look at the new Industrial/Business Pool. We will start with the first of four categories into which Industrial/Business Pool has been condensed: the LR or Railroad allocations. These frequencies are currently being licensed by the Federal Communications Commission. Scanner listeners should be listening for newly allocated splinter channels (VHF 7.5 kHz/UHF 6.25 kHz) to become active in their areas.

159.810	IA	Base or mobile	<AAR Channel 2> LR Canada Only	160.7325	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.280	LR	Base or mobile	<AAR Channel 76>
159.930	IA	Base or mobile	<AAR Channel 3> LR Canada Only	160.740	LR	Base or mobile	<AAR Channel 42>	161.2875	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.050	IA	Base or mobile	<AAR Channel 4> LR Canada Only	160.7475	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.295	LR	Base or mobile	<AAR Channel 79>
160.185	IA	Base or mobile	<AAR Channel 5> LR Canada Only	160.755	LR	Base or mobile	<AAR Channel 43>	161.3025	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.200	IA	Base or mobile	<AAR Channel 6> LR Canada Only	160.7625	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.310	LR	Base or mobile	<AAR Channel 80>
160.215	LR	Base or mobile	<AAR Channel 7>	160.770	LR	Base or mobile	<AAR Channel 44>	161.3175	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.2225	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.7775	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.325	LR	Base or mobile	<AAR Channel 81>
160.230	LR	Base or mobile	<AAR Channel 8>	160.785	LR	Base or mobile	<AAR Channel 45>	161.3325	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.2375	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.7925	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.340	LR	Base or mobile	<AAR Channel 82>
160.245	LR	Base or mobile	<AAR Channel 9>	160.800	LR	Base or mobile	<AAR Channel 46>	161.3475	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.2525	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.8075	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.355	LR	Base or mobile	<AAR Channel 83>
160.260	LR	Base or mobile	<AAR Channel 10>	160.815	LR	Base or mobile	<AAR Channel 47>	161.3625	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.2675	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.8225	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.370	LR	Base or mobile	<AAR Channel 84>
160.275	LR	Base or mobile	<AAR Channel 11>	160.830	LR	Base or mobile	<AAR Channel 48>	161.3775	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.2825	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.8375	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.385	LR	Base or mobile	<AAR Channel 85>
160.290	LR	Base or mobile	<AAR Channel 12>	160.845	LR	Base or mobile	<AAR Channel 49>	161.3925	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.2975	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.8525	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.400	LR	Base or mobile	<AAR Channel 86>
160.305	LR	Base or mobile	<AAR Channel 13>	160.860	LR	Base or mobile	<AAR Channel 50>	161.4075	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.3125	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.8675	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.415	LR	Base or mobile	<AAR Channel 87>
160.320	LR	Base or mobile	<AAR Channel 14>	160.875	LR	Base or mobile	<AAR Channel 51>	161.4225	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.3275	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.8825	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.430	LR	Base or mobile	<AAR Channel 88>
160.335	LR	Base or mobile	<AAR Channel 15>	160.890	LR	Base or mobile	<AAR Channel 52>	161.4375	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.3425	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.8975	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.445	LR	Base or mobile	<AAR Channel 89>
160.350	LR	Base or mobile	<AAR Channel 16>	160.905	LR	Base or mobile	<AAR Channel 53>	161.4525	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.3575	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.9125	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.460	LR	Base or mobile	<AAR Channel 90>
160.365	LR	Base or mobile	<AAR Channel 17>	160.920	LR	Base or mobile	<AAR Channel 54>	161.4675	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.3725	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.9275	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.475	LR	Base or mobile	<AAR Channel 91>
160.380	LR	Base or mobile	<AAR Channel 18>	160.935	LR	Base or mobile	<AAR Channel 55>	161.4825	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.3875	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.9425	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.490	LR	Base or mobile	<AAR Channel 92>
160.395	LR	Base or mobile	<AAR Channel 19>	160.950	LR	Base or mobile	<AAR Channel 56>	161.4975	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.4025	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.9575	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.505	LR	Base or mobile	<AAR Channel 93>
160.410	LR	Base or mobile	<AAR Channel 20>	160.965	LR	Base or mobile	<AAR Channel 57>	161.5125	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.4175	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.9725	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.520	LR	Base or mobile	<AAR Channel 94>
160.425	LR	Base or mobile	<AAR Channel 21>	160.980	LR	Base or mobile	<AAR Channel 58>	161.5275	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.4325	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	160.9875	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.535	LR	Base or mobile	<AAR Channel 95>
160.440	LR	Base or mobile	<AAR Channel 22>	160.995	LR	Base or mobile	<AAR Channel 59>	161.5425	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.4475	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.0025	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.550	LR	Base or mobile	<AAR Channel 96>
160.455	LR	Base or mobile	<AAR Channel 23>	161.010	LR	Base or mobile	<AAR Channel 60>	161.5575	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.4625	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.0175	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.565	LR	Base or mobile	<AAR Channel 97>
160.470	LR	Base or mobile	<AAR Channel 24>	161.025	LR	Base or mobile	<AAR Channel 61>	161.610	LR	Base or mobile	Shared with Maritime Mobile Service (secondary)
160.4775	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.0325	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	452.900	LR	Base or mobile	
160.485	LR	Base or mobile	<AAR Channel 25>	161.040	LR	Base or mobile	<AAR Channel 62>	452.90625	LR	Base or mobile	Bandwidth not to exceed 6 kHz
160.4925	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.0475	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	452.9125	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz
160.500	LR	Base or mobile	<AAR Channel 26>	161.055	LR	Base or mobile	<AAR Channel 63>	452.91875	LR	Base or mobile	Bandwidth not to exceed 6 kHz
160.5075	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.0625	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	452.925	LR	Base or mobile	Train remote control on secondary basis
160.515	LR	Base or mobile	<AAR Channel 27>	161.070	LR	Base or mobile	<AAR Channel 64>	452.93125	LR	Base or mobile	Bandwidth not to exceed 6 kHz/Train remote control on secondary basis
160.5225	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.0775	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	452.9375	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz/Train remote control on secondary basis
160.530	LR	Base or mobile	<AAR Channel 28>	161.085	LR	Base or mobile	<AAR Channel 65>	452.94375	LR	Base or mobile	Bandwidth not to exceed 6 kHz/Train remote control on secondary basis
160.5375	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.0925	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	452.950	LR	Base or mobile	Train remote control on secondary basis
160.545	LR	Base or mobile	<AAR Channel 29>	161.100	LR	Base or mobile	<AAR Channel 66>	452.95625	LR	Base or mobile	Bandwidth not to exceed 6 kHz/Train remote control on secondary basis
160.5525	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.1075	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	452.9625	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz/Train remote control on secondary basis
160.560	LR	Base or mobile	<AAR Channel 30>	161.115	LR	Base or mobile	<AAR Channel 67>	452.96875	LR	Base or mobile	Bandwidth not to exceed 6 kHz/Train remote control on secondary basis
160.5675	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.1225	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	457.900	LR	Mobile	
160.575	LR	Base or mobile	<AAR Channel 31>	161.130	LR	Base or mobile	<AAR Channel 68>	457.90625	LR	Mobile	Bandwidth not to exceed 6 kHz
160.5825	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.1375	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	457.9125	LR	Mobile	Bandwidth not to exceed 11.25 kHz
160.590	LR	Base or mobile	<AAR Channel 32>	161.145	LR	Base or mobile	<AAR Channel 69>	457.91875	LR	Mobile	Bandwidth not to exceed 6 kHz
160.5975	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.1525	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	457.925	LR	Mobile	Remote control allowed
160.605	LR	Base or mobile	<AAR Channel 33>	161.160	LR	Base or mobile	<AAR Channel 70>	457.93125	LR	Mobile	Remote control allowed/bandwidth not to exceed 6 kHz
160.6125	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.1675	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	457.9375	LR	Mobile	Remote control allowed/bandwidth not to exceed 11.25 kHz
160.620	LR	Base or mobile	<AAR Channel 34>	161.175	LR	Base or mobile	<AAR Channel 71>	457.94375	LR	Mobile	Remote control allowed
160.6275	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.1825	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	457.950	LR	Mobile	Remote control allowed/bandwidth not to exceed 6 kHz
160.635	LR	Base or mobile	<AAR Channel 35>	161.190	LR	Base or mobile	<AAR Channel 72>	457.95625	LR	Mobile	Remote control allowed/bandwidth not to exceed 11.25 kHz
160.6425	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.1975	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	457.9625	LR	Mobile	Remote control allowed/bandwidth not to exceed 11.25 kHz
160.650	LR	Base or mobile	<AAR Channel 36>	161.205	LR	Base or mobile	<AAR Channel 73>	457.96875	LR	Mobile	Remote control allowed/bandwidth not to exceed 6 kHz
160.6575	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.2125	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz				
160.665	LR	Base or mobile	<AAR Channel 37>	161.220	LR	Base or mobile	<AAR Channel 74>				
160.6725	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.2275	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz				
160.680	LR	Base or mobile	<AAR Channel 38>	161.235	LR	Base or mobile	<AAR Channel 75>				
160.6875	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.2425	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz				
160.695	LR	Base or mobile	<AAR Channel 39>	161.250	LR	Base or mobile	<AAR Channel 76>				
160.7025	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.2575	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz				
160.710	LR	Base or mobile	<AAR Channel 40>	161.265	LR	Base or mobile	<AAR Channel 77>				
160.7175	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz	161.2725	LR	Base or mobile	Bandwidth not to exceed 11.25 kHz				
160.725	LR	Base or mobile	<AAR Channel 41>								

# Potomac area TRACON

**W**elcome aboard! TRACON is an acronym for Terminal Approach Radar Control which is usually located on the ground floor of an air traffic control tower or nearby. TRACONs control traffic on approach and departure between approximately 5 and 50 miles of the airport.

Norman Hill from Virginia sends us news that there will be a new, consolidated TRACON in the Baltimore/Washington area called Potomac TRACON. Here are some excerpts from its brochure: Thanks, Norm!

## How does the air traffic control system operate now?

Currently the region is served by four major airports, each using its own TRACON—Reagan National, Dulles International, Baltimore/Washington International, and Andrews Air Force Base—all located within a geographical area typically served by only one major airport. Each of these four airports has its own air traffic control tower as well.

Each TRACON is responsible for controlling specifically defined and limited sections of airspace, ensuring that all aircraft entering or departing the airspace are kept separated at safe distances from other aircraft. A TRACON's total airspace is subdivided into small sections or sectors. Each sector is assigned to an individual controller who works in the TRACON facility. That controller directs the movement of aircraft in and out of that space on an individual radar screen and maintains voice contact with pilots.

Although the controller's individual responsibility is only the area that is allocated to him or her, all controllers within a TRACON have full radar information on all the aircraft that are under control of the entire facility. In addition, these controllers are able to communicate with one another instantaneously—something that contributes significantly to assuring the safety of aircraft passengers.

By contrast, controllers have limited ability to communicate with controllers in adjacent TRACONs, even though aircraft will pass from the airspace controlled by one facility into that of another. To assure the safety of such handoffs, aircraft in the Baltimore/Washington area often must use longer routes than would be necessary in a single TRACON.

## What are the benefits of consolidation?

Consolidating the four existing TRACONs in the Potomac region into a single consolidated TRACON (such as New York, Chicago, Southern California, and Bay Area have), will ac-

complish the goals not only of keeping safety first but also of enhancing it. All controllers will have full radar information on all aircraft in the airspace; controller-to-controller communication will be improved, so safety will be improved.

In addition, some routes will be shortened. Flight and waiting times will be reduced and less fuel will be consumed, because controllers can make decisions that will benefit all the aircraft in the expanded airspace.

Because none of the existing TRACON facilities is large enough to house the equipment and personnel necessary to control the larger, consolidated regional airspace, the FAA is building a new facility. This facility will be large enough to accommodate the hardware and workforces of the four existing facilities as well as allow for growth in the future. It will be located at Vint Hill in Fauquier County, Virginia, near Warrenton.

## Aero Websites

A reader from somewhere in Europe, who wishes to be known as 5LGM, has contributed some useful website addresses for our hobby:

### US and International Tables of Frequency Allocations:

[www.ntia.doc.gov/osmhome/allotbl.allockkhz.html](http://www.ntia.doc.gov/osmhome/allotbl.allockkhz.html)

### Aviation info - AeroWeb: The Aviation Enthusiast Corner:

[aeroweb.brooklyn.cuny.edu/air.html](http://aeroweb.brooklyn.cuny.edu/air.html)

### Federal Frequencies:

[geocities.com/CapeCanaveral/8145/feds.htm](http://geocities.com/CapeCanaveral/8145/feds.htm)

### RF Page FCC Navigator:

[www.transmitter.com/fcclinks.html](http://www.transmitter.com/fcclinks.html)

### Radio Navigational Aids and Air Traffic Control:

[www2m.biglobe.ne.jp/~nagase/nav aids/indexe](http://www2m.biglobe.ne.jp/~nagase/nav aids/indexe)

Thanks 5LGM; more sites from him next month!

## Airline info

David T. Stark, an avid scanner listener, has interesting website at [www.nf2g.com](http://www.nf2g.com), also recommended by 5LGM. The following information is reprinted with his permission. Thanks, Dave!

### Airline subsidiaries and contracts

American Airlines - American Eagle  
Continental - Continental Express  
Delta Air Lines - ComAir and Business Express  
TWA - TWExpress  
United - United Express  
USAirways - Allegheny Express, Chautauqua, Commutair,  
**Call Signs**  
Air Shuttle - USAirways Express

AmTran - American TransAir  
Aviat - Esso Canada  
Bix Ex - Business Express  
Blue Ridge - United Express  
Cactus - America West  
Eagle - American Eagle  
Elite - Canada 3000  
Express - FedEx  
Firefly - JetAll  
MidPac - Mid Pacific  
Mountain - FedEx (feeder)  
Northwest - North West Connection  
Partner - Partner Air Services  
Redbird - TWExpress (also uses Waterski, jb)  
St. Clair - South West Air, Ltd.  
Sky Carrier - UPS  
Speedbird - British Airways  
Trader - Martinair  
TransAt - Air Trans Atlantic

## Software Updates

Not too long ago, I decided to invest in **AirNav Internet Lite**, the newest member of the AirNav family. Most of you are already familiar with AirNav's sophisticated products. AirNav Internet Lite is a worldwide internet flight tracking program with many of the same features as the other program, but it relies on the downloaded information from the Internet, instead of using over-the-air signals. To quote the technical information from their website: "The data is downloaded from a meteorological ftp server that receives flight updates from many ATC centers all around the world. You will get on your screen all the flights that send meteorological reports not only by voice (HF), but also using AMDAR (by satellite) and ACARS (VHF)."

The program features multi-window tracking and quite a few worldwide maps to download in addition to the ones included in the original package. I really enjoy using it, and what makes it twice as interesting is listening to HF aero comms while you watch the flights track in near real time.

There are a few bugs in it, such as sometimes finding flights out of place, but not very many, and the program is worth it. The \$64.95 cost is reasonable and you can order online. See their website at [www.airnavsystems.com/](http://www.airnavsystems.com/)

The program can be downloaded on a trial basis to see if you will really do want it. If you pay on line by credit card, you will receive your registration codes in about 3 hours and you're in business!

Xavius Software is supposed to come out with the new version of **ATCC** (an air traffic control simulation) any time after the first of the year. You can check out their website at [www.xavius.com](http://www.xavius.com) or wait for further mention here.

# Air Show Season 2000 Commences

There is nothing quite as thrilling as going to an airshow and watching the Blue Angels or Thunderbirds flight demonstration team strut their stuff in front of thousands of fans. But, add the element of listening to the teams during their shows and your airshow experience will be complete. A handheld scanner opens a whole new world for the monitor during airshows that the non-scanner equipped audience will never know.

Since the air show season for military flight demonstration teams starts this month, *Milcom* will review some possible frequencies to monitor and the schedules (Table One) for several teams.

### Any old scanner won't do

Most handheld scanners currently being marketed are not suited for airshow monitoring. The Uniden brand scanners (except for the BC-3000) cannot be used due to their lack of independent mode selection. If you are going to a Thunderbird (T-bird) show you will need a scanner that will let you monitor the 138-150 MHz range in the AM mode. Most Uniden scanners will not work for VHF T-bird comms, as they will lock you into the FM mode in that frequency range.

Your scanner will also need to cover the 225-400 MHz band. Most of the action (especially the Blue Angels) will be heard in the military aeronautical band. This criteria narrows down our choice of scanners even further for use at airshows.

Below is a list of units appropriate for airshow use. Prices are current Grove prices/stock codes and do not include shipping or taxes (if applicable). Prices are subject to change without notice, so call 800-438-8155 for current info.

Unit	Grove Stock #	Price
Alinco DJ-X10T	WBR-2	\$389.95
AOR AR-8200	WBR-7	\$569.95
Icom R-2	WBR-28	\$199.95
Icom R-10	WBR-6	\$359.95
Sony SC-1	SCN-17	\$249.95
Sony SC-1PC	SCN-18	\$329.95
Uniden BC-3000	SCN-29	\$339.95

Another purchase you should consider is a good set of headphones. A flightline during

an airshow is a very noisy place and a good quality set of headphones designed for high noise environments will help quite a bit in making the audio from your scanner intelligible. Grove sells the Racing Classic headphones (HDP-4 at \$59.95) that work very well with any of the scanners above. These headphones were designed for use at race tracks (also a very noisy place) so they are very well suited for the airshow flightline.

Also don't forget extra charged batteries. Murphy's law applies, and nothing is worse than having your rechargeable battery die half way through the show with your replacements at home in the shack.

### So where is the action?

You will need to concentrate on three different bands for airshow activity. Search in the 138-150.8 MHz band (minus 144-148, in AM and FM modes), 118-136 MHz (AM mode), and 225-420 MHz (AM in 225-400/FM in 406-420 MHz).

The following discrete frequencies were reported in use by the **U.S. Navy Blue Angels** during the 1999 season. Frequencies marked "last reported in 1998" will be dropped in next year's list if no activity is reported on them this season.

Frequency	Usage
142.000	Ground support (Comm Cart)
142.625	Ground support (last reported in 1998)
143.600	Ground support
164.900	Ground support
168.900	Ground support (last reported in 1998)
169.400	Ground support (Comm Cart)
170.900	Ground support (Startup/Taxi)
236.450	Usage unknown
238.150	Show center/Delta formation
251.600	Solo aircraft (5-6) air-to-air
256.250	Usage unknown
263.350	Fat Albert (C-130) flight demonstration
263.500	Usage unknown
264.550	Usage unknown (last reported in 1998)
275.350	Diamond aircraft (1-4) air-to-air
286.000	Usage unknown
307.700	Delta formation air-to-ground
345.900	Solo aircraft (5-6) air-to-air

The following discrete frequencies were reported in use by the **U.S. Air Force Thunderbirds** during the 1999 season.

140.400	Support aircraft: cross country air-to-air
141.400	Four ship formation (Tentative: last reported in 1998)
141.850	Four ship formation (Victor 1) air-to-air which

143.850	is linked to public address system (AM mode)
	Four ship formation (Victor 2) air-to-air which is linked to public address system (AM mode)
235.250	Thunderbird control
322.950	Solo aircraft (5-6) air-to-air
413.025	Maintenance/ground teams (146.2 PL tone)
413.100	Maintenance/ground teams

The U.S. Navy Seal Parachute Team, known as the **Leap Frogs**, are frequent visitors around the country at various sporting events and airshows. Look for their communications on 407.500 MHz. The U.S. Army Parachute Team, known as the **Golden Knights**, also make the rounds during the airshow season. Look for their comms on 123.475 or 123.500 MHz. You should also keep an eye on 32.300, 42.350, 123.425, and 367.700 MHz.

The Canadian Forces aircraft demonstration team is known as the **Snowbirds**. Only two frequencies have been recently reported for this group: 272.100 and 299.500 MHz. Several years ago Daryll Symington in his book *Monitoring The Military* had the following list for the Canadian team. It is unknown how accurate that list is now and it is provided here only for reference purposes.

227.600 (F4), 236.600 (F15), 239.800 (F20), 240.500 (F6), 245.000 (F19), 245.700 (F11), 266.300 (F8), 272.100, 275.800 (F1), 283.900 (F16), 289.400 (F18), 294.500 (F9), 295.600 (F2), 310.800 (F3), 316.500 (F12), 322.800 (F10), 344.500 (F13), 356.600 (F14), 363.800 (F17), 378.500 (F7)

In Europe, the Army Air Corps helicopter display team, the **Blue Eagles**, has been reported on 136.975 MHz. The RAF flight demo team, the **Red Arrows**, has used 243.450 for air-to-air comms. The Turkish military team, the **Turkish Stars**, has been reported on 264.400 MHz.

During the 2000 season we want to hear from our readers about active freqs. If you attend an airshow, please pass along what you hear. You can reach us via e-mail at [larry@grove-ent.com](mailto:larry@grove-ent.com) with a subject line of **Airshow Intercepts**, or you can write us at: Milcom, P.O. Box 98, Brasstown, NC 28902.

Thanks to Bruce and all our contributors who took the time to share their airshow reports. We will see you in two months and good hunting.

**Table One: Military Demonstration Teams 2000 Performance Schedule**

Demonstration schedules subject to change.

Jan 2-Mar 10	Pre-season training at NAF El Centro, CA (Blue Angels)	July 22-23	Hillsboro, OR (Blue Angels)/Pasco, WA (Thunderbirds)/FunFest Kingsport, TN (US Navy Leap Frogs)
March 11	Opening Show, NAF El Centro, CA (Blue Angels)	July 26	Cheyenne, WY (Thunderbirds)/Air Show, Fort Nelson, BC (Snowbirds)
March 18-19	NAS Kingsville, TX (Blue Angels)	July 28-31	Hall of Fame Game Columbus, OH (US Navy Leap Frogs)
March 25-26	Punta Gorda, FL (Blue Angels)	July 29	Yellowknife International Air Show, NT (Snowbirds)
March 29	Langley AFB, VA (Thunderbirds)	July 29-30	Elmendorf AFB, AK (Blue Angels)/Billings, MT (Thunderbirds)
April 1-2	Augusta, GA (Blue Angels)/MacDill AFB, FL (Thunderbirds)	July 30	Peace Regional Air Show, Peace River, AB (Snowbirds)
April 1-4	Pittsburgh Pirates, PA (US Navy Leap Frogs)	August 1	Fort Smith Air Show, NT (Snowbirds)
April 8-9	Marine Corps Air Station (MCAS) Beaufort, SC (Blue Angels)/Mesa, AZ (Thunderbirds)	August 2	Hay River Air Show, NT (Snowbirds)
April 13	San Diego Padres, CA (US Navy Leap Frogs)	August 3-8	Mountain Home AFB Airshow, ID (US Navy Leap Frogs)
April 15-16	Barksdale Air Force Base (AFB), LA (Blue Angels)/Chattanooga, TN (Thunderbirds)	August 5	Fairchild AFB, WA (Thunderbirds)/Air Show, Kelowna, BC (Snowbirds)
April 15-18	Boston Red Sox /Marathon, MA (US Navy Leap Frogs)	August 5-6	Seattle, WA (Blue Angels)
April 22-23	Break (Thunderbirds)	August 6	Mt. Home AFB, ID (Thunderbirds)/Penticton Air Fair, BC (Snowbirds)
April 27-May 1	NAS Atlanta, GA (US Navy Leap Frogs)	August 11-13	Abbotsford International Air Show, BC (Snowbirds)
April 29-30	Knoxville, TN (Blue Angels)/Altus AFB, OK (Thunderbirds)	August 12-13	Westover ARB, MA (Thunderbirds)
May 4-8	Sea and Air Show Ft. Lauderdale, FL (US Navy Leap Frogs)	August 14-21	Mid Season Break (Thunderbirds)
May 6	Nellis AFB, NV (Thunderbirds)	August 15	Calgary Air Show, AB (Snowbirds)
May 6-7	Sea and Air Show Ft. Lauderdale, FL (Blue Angels/Leap Frogs)	August 17-21	Chicago Air & Water Show, IL (US Navy Leap Frogs)
May 7	Holloman AFB, NM (Thunderbirds)	August 19-20	Chicago, IL (Blue Angels)/Canada Remembers International Air Show, Saskatoon, SK (Snowbirds)
May 10	MCAS Cherry Point Air Show, NC (Snowbirds)	August 23	Grand Bend International Air Show, ON (Snowbirds)
May 11-15	NAS Fort Worth Airshow, TX (US Navy Leap Frogs)	August 26	Ellsworth AFB, SD (Blue Angels)
May 13-14	NAS/Joint Reserve Base (JRB) Fort Worth, TX (Blue Angels)/March ARB, CA (Thunderbirds)/Val d' Or Air Show, PQ (Snowbirds)	August 26-27	Offutt AFB, NE (Thunderbirds)/Thunder in the Air, Thunder Bay, ON and Thunder over Niagara, Niagara Falls, NY (Snowbirds)
May 16	Air Show, Iroquois Falls, ON (Snowbirds)	September 2-4	St. Louis, MO (Blue Angels)/Cleveland, OH (Thunderbirds)/Canadian International Air Show, Toronto, ON (Snowbirds)
May 18	Air Show, Elliot Lake, ON (Snowbirds)	September 7	Air Show, Charlottetown, PE (Snowbirds)
May 20	Russ Blakely Heritage Air Show, Sudbury, ON (Snowbirds)	September 9	Peterson AFB, CO (Thunderbirds)/Yakima International Air Fair, WA (Snowbirds)
May 20-21	Joint Services Open House, Andrews AFB, MD (Blue Angels)/Thunderbirds)	September 9-10	Grand Junction, CO (Blue Angels)/Nova Scotia International Air Show, Shearwater, NS (Snowbirds)
May 22	Air Show, Leamington, ON (Snowbirds)	September 10	Kirland AFB, NM (Thunderbirds)
May 23	United States Naval Academy (USNA), Annapolis, MD (Blue Angels)	September 12	Air Show, St. Stephen, NB (Snowbirds)
May 24	US Naval Academy Graduation Fly-by, Annapolis, MD (Blue Angels)/Air Show, Port Elgin, ON (Snowbirds)	September 14	Brantford Air Show, ON (Snowbirds)
May 25-29	Korean War Memorial Kansas City, MO (US Navy Leap Frogs)	September 14-17	Reno, NV (Blue Angels)
May 27-28	Randolph AFB, TX (Thunderbirds)/Muskoka International Air Show, Gravenhurst, ON (Snowbirds)	September 14-18	Korean War Memorial Norfolk, VA (US Navy Leap Frogs)
May 28	Bangor, ME (Blue Angels)	September 16-17	Klamath Falls, OR (Thunderbirds)/National Capital Air Show, Ottawa, ON (Snowbirds)
May 31	USAF Academy, CO (Thunderbirds)	September 22-24	Wings of Eagles Air Show, Elmira, NY (Snowbirds)
June 2-4	Texas Rangers Arlington, TX (US Navy Leap Frogs)	September 23-24	NAS Oceana, VA (Blue Angels)/Burlington, VT (Thunderbirds)
June 3-4	Myrtle Beach, SC (Blue Angels)/Hanscom AFB, MA (Thunderbirds)/Winnipeg International Air Show, MB (Snowbirds)	Sept 29-Oct 1	California International Air Show, Salinas, CA (Snowbirds)
June 5-25	European Tour (Thunderbirds)	Sept 30 - Oct 1	Redding, CA (Blue Angels)/Springfield, IL (Thunderbirds)
June 6	Air Show, Red Lake, ON (Snowbirds)	October 2-5	Department of Defense Reunion Pensacola, FL (US Navy Leap Frogs)
June 7-12	Bristol Motor Speedway, TN (US Navy Leap Frogs)	October 4	Tucumcari Rotary Club Air Show, NM (Snowbirds)
June 8	Air Show, Barrie, ON (Snowbirds)	October 5-10	Page / Lake Powell Airshow Page, AZ (US Navy Leap Frogs)
June 10-11	LaCrosse, WI (Blue Angels)/Bagotville Air Show, PQ (Snowbirds)	October 6-8	Air Fair 2000, Eugene, OR (Snowbirds)
June 13	Air Show, Peterborough, ON (Snowbirds)	October 7	Vance AFB, OK (Thunderbirds)
June 14	Greater Kingston International Air Show, ON (Snowbirds)	October 7-8	San Francisco, CA (Blue Angels)
June 17-18	Avoca, PA (Blue Angels)/St. John International Air Show, NF (Snowbirds)	October 8	Laughlin AFB, TX (Thunderbirds)
June 19-26	Rhode Island Airshow N. Kingston, RI (US Navy Leap Frogs)	October 11	Thunderbird Balloon Classic and Air Show, Glendale, AZ (Snowbirds)
June 21	Air Show, St.-Frederick-de-Beauce, PQ	October 12-16	Las Vegas Airshow, NV (US Navy Leap Frogs)
June 24-25	North Kingstown, RI (Blue Angels)/London Air Show and Balloon Festival, ON (Snowbirds)	October 13-15	MCAS Miramar, CA (Blue Angels)/Air Show, Las Vegas, NV (Snowbirds)
June 26	Air Show, Cobourg, ON (Snowbirds)	October 14-15	Vandenberg AFB, CA (Thunderbirds)
June 29	Air Show, Trois Riviere, PQ (Snowbirds)	October 19-22	U.S. Naval Academy Homecoming Annapolis, MD (US Navy Leap Frogs)
June 29-July 4	July 4th Demonstration Coronado, CA (US Navy Leap Frogs)	October 21	Shaw AFB, SC (Thunderbirds)
July 1-2	Traverse City, MI (Blue Angels)/Moffett, CA (Thunderbirds)	October 21-22	Jackson, MS (Blue Angels)
July 2	Air Show, Sherbrook, PQ (Snowbirds)	October 22	Langley AFB, VA (Thunderbirds)
July 4-5	Hot Air Balloon Championships/Air Show, Battle Creek, MI (Thunderbirds/Snowbirds)	October 28-29	NAS/JRB New Orleans, LA (Blue Angels)/Long Island, NY (Thunderbirds)
July 5-9	Fleet Week New York, NY (US Navy Leap Frogs)	November 2-6	NAS Jacksonville Airshow, FL (US Navy Leap Frogs)
July 6	Air Expo 2000, Minot, ND (Snowbirds)	November 4-5	NAS Jacksonville, FL (Blue Angels)/Davis Monthan AFB, AZ (Thunderbirds)
July 8-9	Coney Island, NY (Blue Angels)/Saskatchewan Air Show, Moose Jaw, SK Canada (Thunderbirds/Snowbirds)	November 9-12	Ft. Pierce Muster, FL (US Navy Leap Frogs)
July 10-17	East Coast Reunion / NPT Tryouts Virginia Beach, VA (US Navy Leap Frogs)	November 10-11	NAS Pensacola, FL (Blue Angels)
July 14-15	Pensacola Beach, FL (Blue Angels)	November 11-12	Lake City, FL (Thunderbirds)
July 15-16	Davenport, IA (Thunderbirds)	Nov 30-Dec 3	Navy/Army Game Philadelphia, PA (US Navy Leap Frogs)
July 19	Air Show, Castlegard, BC (Snowbirds)		
July 20	Air Show, Grand Forks, BC (Snowbirds)		
July 22	Kamloops International Air Show, BC (Snowbirds)		

## X-Files Radio

Every once in awhile, while DXing, one hears something that just doesn't make sense. "I heard it, but I don't believe it!"... Sometimes, there's a perfectly natural explanation; other times, you just have to accept that you'll never know what you really heard.

This month's first strange reception comes from the U.K.. Mark Hattam, an AM DXer there, was looking for FM DX from Europe on 87.7 MHz. He wasn't expecting to hear from America! Mark caught on tape a few seconds of what appear to be television sound, with an American-accented male introducing a live picture and indicating the current time was 5:26. (But when Mark heard this signal, it was 15 minutes after the hour – it wasn't 5:26 anywhere in the world!) An

American-accented female voice overrides him just long enough to say two words — many listeners believe she was on a different station.

Two Americans have identified the audio as a tape of KNBC-TV Los Angeles coverage of a 1994 earthquake. Unfortunately that doesn't answer much, as KNBC-TV is on channel 4, not channel 6. In any case, there is no known propagation method that would allow a California signal on this frequency to reach the U.K. The chief engineer of WECT-TV, a channel 6 station in Wilmington, North Carolina, believes the female voice belongs to one of his station's announcers. You can listen for yourself at <http://www.dxradio.demon.co.uk/unid.html>.

Radio amateurs have been trying to span the Atlantic on VHF for years, and there have been rare reports of partial success. (For example, the reception of a New Jersey FM station in the Azores Islands in the mid-1970s.) In this case, it sounds like a **reflection off a meteor trail** was at least

partially responsible. Atmospheric conditions were also favorable for **tropospheric propagation** across a fair part of the Atlantic. Hopefully, someday we'll be able to conclusively prove which station Mark was listening to. I suspect the exact method of reception will forever remain a mystery.

Less exotic mysteries happen every day. A common one is the apparent reception of a distant foreign station on the AM band. While it is possible to receive overseas stations on AM, it's very unlikely, unless you have an extensive antenna system or live right on the coast. It's much more likely that you're actually **hearing Canada**.



*The frequencies formerly used by CBC Radio in Montreal are no longer silent. 740 in Toronto won't be silent much longer either; DX it while you can!*

CBC Radio One's overnight service relays several well-known international broadcasters from 12 different countries in English. Some AM radios have been known to receive 31-meter shortwave transmissions directly. (Reception of WWV on your AM radio is a good sign this is happening; no broadcaster in their right mind would intentionally relay WWV!)

It should also be noted that most radios can have **spurious responses** — they can appear to pick up signals on frequencies they aren't actually broadcast on. Front-end overload is the most common cause of this. This is essentially the same phenomenon as the distortion you hear when you turn up a radio too loud. It's hard to avoid this problem; moving away from the powerful local station is usually the only fix.

You should be aware of **image responses**. Due to receiver circuit design, you may hear powerful local stations at a second point on the dial, 900, 910, or 920 kHz lower than the frequency on which they actually broadcast. Again, there really

is no easy fix — you simply need to be aware that this is not a real signal.

### Bits and Pieces

- The official callsigns of the new occupants of 690 and 940 in Montreal have now been released. 690 is CINF "Info 690" and relays the LCN French-language cable TV service overnight. 940 is CINW "940 News." The two stations are being simulcast on their old frequencies of 850 and 600 respectively; the simulcast is to end by mid-May.

- 740 kHz, the former CBL frequency in Toronto, has been silent for several months. It won't be staying that way for long. On January 31, a hearing was held in Toronto to consider eight applications for this channel. Also to

be heard were eight applications for 93.5 FM; three for 106.3 FM; and two for other FM frequencies. Frequently-heard Asian ethnic station CHKT-1430 was among the applicants. CHKT had requested both 93.5 FM and 740 AM; the notice didn't indicate which frequency they preferred.

- Benjamin Dawson of Seattle noted my recent comments about the FCC reserving 1610 kHz for travelers' information stations. He writes, "...there are a fairly large number of TIS stations on 1610 which are federally owned, not licensed by FCC but authorized by NTIA (National Telecommunication and Information Administration) through IRAC (Interagency Radio Advisory Committee), and they are not secondary to broadcast." He also writes that this was explained in the rulemaking which established the expanded band. Thanks for that information!

Are there any strange, unexplained signals in your log? Write me at Box 98, Brasstown NC 28902-0098, or by email to [w9wi@bellsouth.net](mailto:w9wi@bellsouth.net). Good DX!



# DXing Clandestine Radio Stations

Clandestine radio DXers used to have a tough time finding information on these elusive revolutionary voices. But, the *Clandestine Radio Watch* newsletter has become a truly invaluable and amazing resource. It's free at <http://www.swl.net/swl-de/swl-cla.html> on the internet; you can't beat the price. There has never been a better resource for finding clandestine DX information, you'll love it.

It also pays to keep your eyes open. Multiple anonymous sources tell *Monitoring Times* that **Radio Cascadia**, an FM clandestine station, operated continuously on 87.9 MHz FM in Seattle during the World Trade Organization demonstrations last year. They aired leftist propaganda, including several Radio Havana programs. You never know when something like this will appear, so a scan of your local FM dial can produce unexpected results.

## Searching for Addresses?

Martin Schoech, the maven at *Clandestine Radio Watch*, also has an outstanding collection of pirate radio address lists on his web site. If you're trying to find a contact point, <http://www.swl.net/swl-de/swl-pir.html> is a marvelous place to check.

## What's on the Air

Our readers again heard plenty of North American shortwave pirates this month; let us know what you have logged lately! As usual, we list programming formats and contact maildrops: Nearly all stations operate within 10 kHz of 6965 kHz, although a few have been trying 1710 or 1720 above the expanded medium wave AM band. Another place to check for daytime pirate activity is the region around 13910 kHz. With sunspots nearing maximum, some stations have been getting out great distances just below the 20 meter amateur radio band.

**Blind Faith Radio**- Dr. Napalm features classic rock; his January 1 show was the first pirate log of 2000 for many. (Merlin)

**Ground Zero Radio**- Their novelty music presumably comes from a nuclear test site. (uses [gzrsw@usa.net](mailto:gzrsw@usa.net))

**Happy Hanukkah**- December and January usually produce holiday stations like this one. (Merlin)

**He Man Radio**- He Man broadcasts masculine advocacy from a hilltop somewhere in Ohio. (Blue Ridge Summit)

**Jerry Rigged Radio**- Novelty music is creeping into their format. (Providence)

**KIPM**- Alan Maxwell hosts the most elaborate dramas on the pirate bands; you need a decent signal to appreciate the complexity. (Lula)

**KMUD**- Rock music and creative sketches from the

Kingdom of Inyo, best heard in western North America. (Lone Pine)

**KRMI**- Their sketches have nothing to do with Jeff White's **WRMI**; their slogan is Radio Michigan International. (None, verifies logs in *The ACE*.)

**Lounge Lizard Radio**- Dean Soundgarden programs lounge music from various saloons. (Providence)

**One Voice Radio**- Joe, a longtime veteran pirate with calm health tips, sounds like a chipmunk lately. (Belfast)

**Radio Aesop**- You don't hear fables like this on commercial radio, that's for sure. (uses [radioaeso@yahoo.com](mailto:radioaeso@yahoo.com) e-mail)

**Radio Azteca**- Bram Stoker's unique humor about DXing and DXers is very clever. (Belfast)

**Radio Bingo**- John Arthur always wins this bingo game, but he never collects any winnings. (None)



The voice of Captain Ron

**Radio Corbain**- Rock music is their fare, but lately pirate commentary has crept in. (None)

**Radio Freedom**- They've been around for a while, but they still are somewhat of a mystery. (None)

**Radio Free Speech**- Bill O. Rights promotes pirate radio and individual freedom. (Belfast)

**Radio Garbanzo**- Fearless Fred's original comedy will make you laugh out loud. (Belfast)

**Radio Gerbil**- They parody Radio Azteca in a clever way; don't be fooled by the multiple ID's. (Providence)

**Radio Metallica Worldwide**- Dr. Tornado, with his 10 kilowatt "flamethrower" transmitter, is easily heard. (Blue Ridge Summit)

**Radio Tornado Worldwide**- The parody of Dr. Tornado at Radio Metallica is back. (None)

**Radio Toronto**- This new one has local Toronto stories, ads, and content from a Toronto university. (Merlin)

**Radio USA**- Mr. Blue Sky's station has been on for over 15 years; this may be a current record. (Belfast)

**Voice of Captain Ron Shortwave**- The Captain is sending out QSLs, as we see here. (uses [CaptainRonSWR@yahoo.com](mailto:CaptainRonSWR@yahoo.com) e-mail)

**Voice of Green Acres**- Claiming to be the worst pirate on the air, they succeed with endless repeats of the TV show theme. (None)

**Voice of Prozac**- Known as the relaxation station, this one wants to calm you down. (Pittsburgh)

**WACK Radio**- They mix rock with remarks phoned in

by DXers via their toll free phone line. (Try 888-959-8177)

**WBNY**- The Voice of the Rodent Revolution is an excellent clandestine station parody. (None anymore)

**WHYP**- The James Brownyard memorial station always features old recorded remarks from licensed WHYP in North East, PA. (uses [whyp1530@yahoo.com](mailto:whyp1530@yahoo.com) e-mail)

**WMFQ**- This rocker's purpose is encouragement for QSL chasers. (Providence)

**WMOE**- Look for the Three Stooges interval signal from this rock station. (uses [wmoe6955@yahoo.com](mailto:wmoe6955@yahoo.com) e-mail)

**WRX**- Jimmy the Weasel's sings about what he's going to do with the FCC, but it's not printable. (Manomet or Lula)

## Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 24, Lula, GA 30554; PO Box 1464, Manomet, MA 02345; PO Box 293, Merlin, Ontario N0P 1W0; PO Box 25302, Pittsburgh, PA 15242; and PO Box 928, Lone Pine, CA 93545. Some stations verify logs in *The ACE* bulletin (\$21 via PO Box 15830, Chesapeake, VA 23328) or in *Free Radio Weekly* (free to contributors via [yukon@mdn.net](mailto:yukon@mdn.net)).

## Thanks

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail addresses atop the column. We appreciate material sent in this month by Shawn Axelrod, Winnipeg, Manitoba; Graham Barclay, Napier, New Zealand; Kirk Baxter, Canton, OH; Ranier Brandt, Hoefer, Germany; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Klaus Dieter-Scholz, Erfurt, Germany; Joe Filipkowski, Providence, RI; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Paul Griffin, San Francisco, CA; Sheldon Harvey, Montreal, Quebec; William T. Hassig, Mt. Prospect, IL; Wayne Joyner, Omaha, NE; Bob Lagg, Riverside, CA; Bill McClintock, Minneapolis, MN; Ruben Manischavitz, Necedah, WI; Greg Majewski, Oakdale, CT; Mark Meece, Cincinnati, OH; Big Mike, Belfast, NY; Dr. Napalm, Merlin, Ontario; Jon Oldenburg, Appleton, WI; Al Quaglieri, Albany, NY; Adrian Peterson, Indianapolis, IN; Michael Prindle, New Suffolk, NY; Lee Silvi, Mentor, OH; Bud Stacey, Setsuma, AL; DJ Stevie, Basel, Switzerland; Enrique Alejandro Wembagher, Buenos Aires, Argentina; Niel Wolfish, Toronto, Ontario; and Mike Wolfson, Ashland, OH.

# A Natural Radio Receiver

**D**Xing beacons can be a lot of fun, but sometimes you need a change of pace. This month, we're going to explore a way that you can tune into the "lowest of the low" radio frequencies – the land of Natural Radio. Perhaps you've read about the signals that can be heard here; Sferics, Tweaks, Whistlers and Dawn Chorus to name a few. Now is your chance to hear these sounds for yourself using a homebrew receiver.

You're invited to join me as I build my own "Bare Bones Basic" BBB-4 receiver along the lines of the one described on the Longwave Club of America's web site at [www.lwca.org/library/hardware/bbb4rx3.txt](http://www.lwca.org/library/hardware/bbb4rx3.txt). I've given enough detail here for you to build your own receiver, but I highly recommend visiting the web site for helpful background information and operating tips.

## The Receiver

The BBB-4 is a wideband ELF receiver with a peak response near 2 kHz. It was designed by Stephen P. McGreevy (CA) and is very similar to the WR-3 commercial model that was offered for sale until recently. (As explained on Stephen's web site –

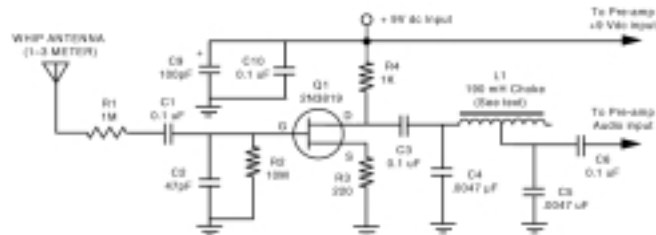


Fig. 1. Natural Radio Receiver

[www.triax.com/vlfradio/](http://www.triax.com/vlfradio/) – he is now focusing on his main interest as a natural radio recordist. Be sure to visit his web site for some excellent material on natural radio, including sound clips.

The BBB-4 is, as its name implies, about as basic as you can get and still have good natural radio performance. All of the parts for the receiver are readily available from Radio Shack, Digi-Key Corp. or Mouser. Those with a well-stocked junk box might be able to build it without making any parts purchases.

The schematics shown on the web are composed of text characters to ensure com-

patibility with all browsers and computer platforms. While the diagrams are readable, I chose to redraw them for improved clarity before beginning construction. Figures 1 & 2 show the new artwork.

In redrawing the circuits, I made two minor changes: First, I combined the "front-end" and filter schematics into one drawing. Secondly, I changed the values of resistors R3 and R4 to allow using a Radio Shack 2N3819 for Q1 instead of the harder to find 2N5484. (These changes are recommended in the original text when a 2N3819 is used.)

## Mechanical Considerations

I'm building the BBB-4 on a small piece of "perfboard" using simple point-to-point wiring. Sheets of this material are available from Radio Shack and may be cut to the desired size. Standoff bolts may be used at the corners of the board to mount it inside an enclosure.

A metal enclosure is recommended for RF shielding. I chose an aluminum project box (Radio Shack No. 270-238) as it has plenty of room inside for mounting the perfboard, connectors, 9V battery, etc. A somewhat smaller box could probably be used, but I wanted the extra room to "experiment" – at least for my first attempt.

## Whip Antenna

The project calls for using a whip antenna 1 to 3 meters long. I selected a "universal replacement" type that extends to roughly 1.5 meters. To mount the antenna, some ingenuity will be required. The most important thing is to make sure it is insulated from the metal enclosure.

I suggest insulating the bottom few inches of the antenna with heat shrink tubing (or electrical tape), and then mounting it to the inside of the metal box with a pair of cable straps. A short "pigtail" of wire can be used

to connect the antenna to the circuit board.

## Component Notes

Most of the parts values on the schematic are self explanatory. An item that may need some explanation is L1, the 180-200 millihenry (μH) choke. If you have a choke in this range, go ahead and use it. If not, an acceptable substitute is the primary winding of a 1k ohm center-tapped audio transformer (Radio Shack No. 273-1380). According to the instructions, you'll need to use the black (center tap) lead and either the green or blue wire (end of the primary) for the proper inductance. All other leads are unused.

Remember that Q1 is a field-effect transistor (FET) and it is subject to damage from static electricity. Use caution to avoid static discharge when handling the FET, and install it into the circuit last.

## Outboard Amplifier

The BBB-4, as shown, will provide sufficient output to drive a tape recorder input or an audio amplifier, but it is not high enough for direct listening with a speaker. An inexpensive outboard amplifier such as the Radio Shack No. 277-1008 is recommended for this purpose. It is a compact unit with a built-in speaker and volume control.

## Parts Sources

Most readers probably have a Radio Shack store within easy driving distance, but if you prefer to order parts by mail or have trouble locating a particular part, there are other options. Here are two well-known suppliers to the electronics hobby:

**Mouser**, 958 N. Main St., Mansfield, TX 76063-4827; tel 800-346-6873

**Digi-Key Corp.**, 701 Brooks Ave. S., Thief River Falls, MN 56701-0677; tel 800-344-4539

You should now have plenty of information to get started on your own receiver. Next month, I'll discuss final assembly and turning the receiver on for the first time. Till then, happy building.

## Restructuring (A personal perspective)

**T**he long awaited amateur license restructuring has arrived! What does it mean to the amateur community? On the surface, it seems to be the answer so many of us have been hoping for to repopulate the ham bands. However, anyone who has been around since the days of incentive licensing will most likely say, "Let's see what happens."

### ■ In the Beginning (Incentive Licensing)

I was a relatively new ham back in 1967 when the ARRL-promoted incentive licensing went into effect. The immediate result of this action was to restrict many (85%) or more of the existing amateurs from operating on frequencies they had been using many years.

Previous to '67 there were three grades of license, the Novice, Technician and General. The Novice was restricted to CW on 80, 40 and 15 meters and phone on two meters. In addition, the Novice license was a one year, non-renewable license. Techs were allowed any mode and full power on bands above 50 MHz. (Actually Techs were restricted to bands above 220 MHz till several years after incentive licensing.)

The General class allowed full amateur privileges on all bands. The Advanced did not really exist previous to '67. (It did, but it carried no additional privileges, and no Advanced licenses were issued after 1952.) You could obtain an Extra class license, but all it gave you was a type of license on your certificate.

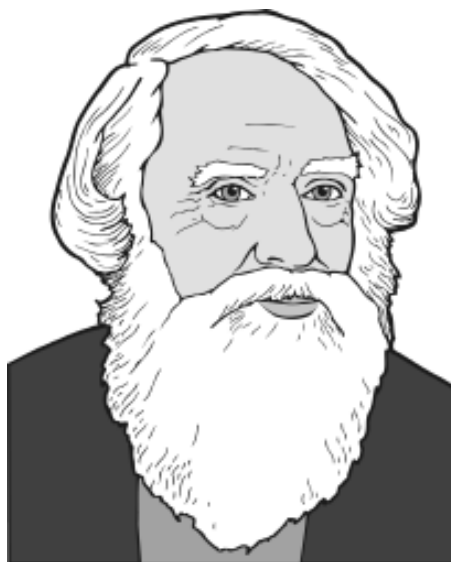
### ■ The Band-Aid Years

As most of us can imagine, amateur licensing ground to a halt! The resentment was overwhelming and hams abandoned the ARRL and the hobby in fairly large numbers. Many who remained continued to fight the incentive licensing restrictions, and the rest went ahead and bit the bullet, advancing to higher classes of licenses. No one was really happy.

The initial reason for the incentive licensing was the belief by the ARRL board that forcing hams to learn more technical material would bring about a better grade of

amateur! What it produced was a considerable amount of bickering and infighting, and a reduction of amateur growth.

After a few years of this the ARRL began to rethink its position and, while not admitting it had been wrong in pushing the incentive issue, started to look for band-aids to stem the flow of life from the hobby. Each band-aid produced a little help, but not nearly enough. Some of the band-aids were allowing techs on 50 MHz and above, making the Novice a five year renewable license, permitting techs all Novice privileges, and then a No Code License. None of it helped very much and amateur numbers continued to drop.



*Samuel Morse*

### ■ Defining the Morse Code Question

In the late 90s it finally became apparent that ham radio was losing ground in a big way. Many users of radio were giving up Morse Code in favor of newer, faster communication techniques. Several countries were in favor of eliminating the code requirement for obtaining a ham license and others reduced the requirement to 5 wpm. So "the writing was on the wall." CW was no longer needed and is going to be chucked by everyone soon!

All of this finally lit a light at ARRL headquarters and they began to look for ways

out of the dilemma. Several ideas were put on the table, all of them proposing reduced code requirement and fewer grades of license. The FCC recognized the need to restructure and made their own proposal. In the end the FCC prevailed with an even greater reduction in code speed and technical knowledge requirement for obtaining a amateur license. Just before New Year 2000 they issued their ruling. The substance of their decision can be read on other pages in this magazine.

It is important to note that the ARRL has for years stated the only reason for ham radio to exist is "public service." Their definition of public service was sending radiograms and providing communications at parades, emergencies and other public events. Not once has the ARRL recognized that the technical training provided by the amateur radio service was the most important "service" ham radio has provided to our country. The idea of calling ham radio a hobby seemed to curdle the blood of a true ARRLer.

The FCC, on the other hand, stated in their proposal, "Besides drastically streamlining the Amateur Radio licensing process, this action will eliminate unnecessary requirements that may discourage or limit individuals from becoming trained operators, technicians and electronic experts."

### ■ More is Needed

The reduction of the number or grades of ham license and easing of test requirements is a giant step forward, and I hope it represents the turn-around of the dwindling numbers of amateurs. There are still some rough spots to be ironed out, but the first major step has been taken.

If the public is not made aware that it is now easier than ever to become a ham, we still face tough going. The ARRL's most important role now is to head up a publicity campaign, putting a team to work getting the message into major national publications and newspapers.

Those of us who are hams also need to tell the public what amateur radio is all about, how much fun it is, and how it can lead to rewarding knowledge and careers. Those of you who aren't hams yet, jump on in; it's another aspect to your public service and it's never been easier.

See ya next month: 73 de Ike

# Vehicular Antennas: Part II

Last month we talked about vehicular antennas for AM and FM broadcast reception. The design problems offered by those applications are actually somewhat different from those encountered in vehicular antennas utilized for transmitting as well as reception (i.e., two-way communication, or "TWC").

Whereas we saw that essentially untuned (non-resonant) antennas are acceptable for broadcast reception, TWC antennas are typically resonant at their frequency of operation. Resonant elements have certain advantages as explained below.

## HF Vehicular Antennas

Although loops have been used at times as the elements for amateur and military HF vehicular antennas, 1/4 wave whips are the most commonly employed design. In vehicular communication, the direction from the vehicle's antenna to the station with which it is in communication may change rapidly. This simple fact is one reason why whip antenna elements, with their nondirectional radiation-reception patterning, have become the de-facto standard for vehicular communications. Another reason for the popularity of vertical whip antennas is that they are relatively rugged and trouble-free compared to other, more complex, designs.

If the operating frequency of the antenna is up near 25 or 30 MHz, then a long, tapered, spring-steel rod 8 feet or so in length may be a sufficient element to attain the desired 1/4 wavelength resonance. At frequencies lower than this, it is likely that inductive loading (a coil) will be included within the length of the whip (fig. 1A) to attain resonance.

When the operating frequency is toward the lower end of the HF band it may be necessary to utilize capacity loading as well. This can be a strip of metal, or metal "capacity hat," connected to the

whip above the loading coil (fig. 1A). By the use of loading coils and capacity devices it is even possible to devise useful whip antennas for frequencies as low as the high-frequency end of the MF band.

## VHF and UHF Vehicular Antennas

Because the wavelengths involved are so much shorter at VHF and UHF frequencies than for the HF band it is simpler to design vehicular TWC antennas for these higher-frequency bands. Mounting the shorter antenna-element lengths on a vehicle usually proves no great challenge. Often the antenna can be mounted in the center of the vehicle's roof (fig. 1B), giving it a nicely nondirectional pattern as compared to most other mounting locations.

Inductive and capacitive loading are seldom, if ever, necessary at these higher frequencies. Within the higher frequencies of the VHF band, and in the UHF bands, antenna-element lengths are sufficiently short that designs requiring more space, such as the halfwave and 5/8 wave designs, are practical.

## Amateur HF Vehicular TWC Antennas

Amateur radio operators have always been known as a group that likes to experiment and to develop new and more effective ways of getting their radio communications accom-

plished. Before the ruggedness and convenience of whip elements made them "standard" for HF vehicular-antenna elements, hams experimented with a variety of mobile antenna designs.

One of the early designs (that never became popular) was a large HF loop antenna made from a couple of tall whips separated by the length of the vehicle, and connected together at the top. This design showed some undesirable directivity and was cumbersome to construct and to use.

Directionality was circumvented to a good degree on HF by the use of whip antennas, although, due to limitations of mounting sites on most vehicles, there will be some directionality in any HF whip installation.

Of course, amateur radio operators want to be able to change operating frequency within bands and to switch easily from band to band. On the HF bands this led to devising various ways in which both the inductance utilized in HF antenna loading coils and the capacity of capacity-loading devices could be made adjustable, so that various operating frequencies could be utilized. As automatic tuning of antenna loading coils was developed, it became the most popular approach.

## Amateur VHF and UHF Vehicular TWC Antennas

The halo VHF antenna was a popular, omnidirectional, horizontally-polarized vehicular antenna for a while. It was constructed as a horizontal, folded-dipole, curved into a circle to give it a nondirectional radiation and reception pattern (fig. 1C). It was also capacitively end-loaded to reduce its length.

Another omnidirectional, horizontally-polarized vehicular antenna was the "big wheel" (fig. 1D). This antenna had more gain than the halo — and also a more ungainly appearance. Both these antennas had a somewhat awkward shape for mobile

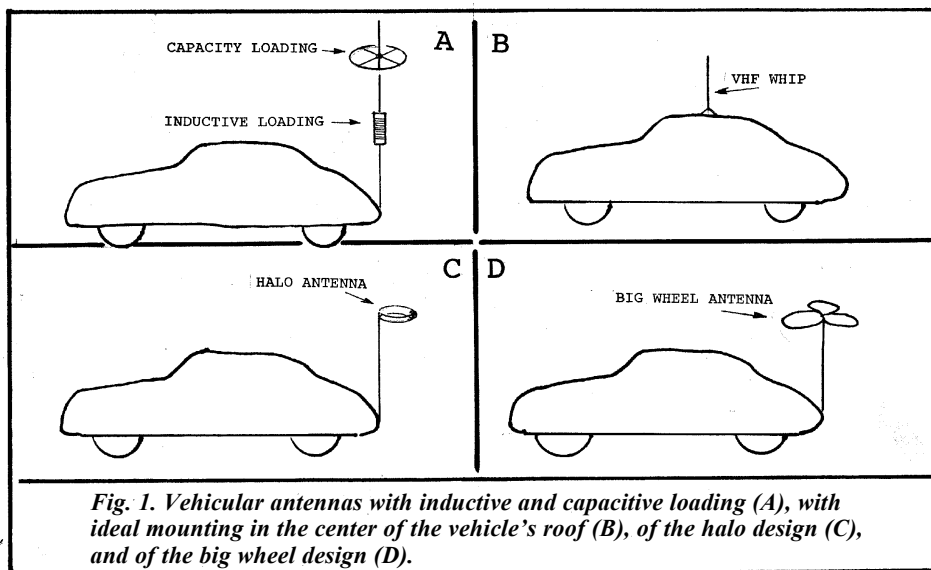


Fig. 1. Vehicular antennas with inductive and capacitive loading (A), with ideal mounting in the center of the vehicle's roof (B), of the halo design (C), and of the big wheel design (D).

use. With the growing popularity of whip antennas, and therefore of vertical polarization, horizontally-polarized vehicular antennas became much less common.

On these shorter wavelengths some designs of vehicular beam antennas become practical in size, although trying to operate them while the vehicle is in motion introduces the directionality problem mentioned earlier. Usually such beams are used only when the vehicle is parked.

## **RADIO RIDDLES**

### ■ Last Month:

I asked: "I've mentioned resonant antennas several times above. Is it important, or even useful, for an antenna to be resonant?"

To answer let's first briefly define an antenna's feedpoint impedance. The point at which the antenna's feedline attaches to the antenna is the feedpoint. Depending on the antenna system's design and the point on the antenna where the feedline is attached, the opposition which the feedpoint offers to signal-current flow may vary considerably. This opposition is called "impedance," and will be part (or all) resistance, and may also be part either inductive or capacitive reactance. (Resistance and reactance are two different kinds

of opposition to signal flow which combine to produce impedance.) An antenna is said to be resonant at the frequency at which its input impedance is composed of only resistance, with no capacitive or inductive reactance.

An antenna will have a specific feedpoint impedance: perhaps 50 ohms, perhaps 75 ohms, perhaps something else. When a resonant-design antenna is operated at its resonant frequency, and if the impedance of its feedline is the same value as the feedpoint impedance of the antenna, then the antenna and feedpoint impedances are then said to be "matched."

In this matched condition, all of the energy fed to a transmitting antenna from the feedline will be accepted by the antenna, and the amount of energy which the antenna has available to radiate will be maximum. If the antenna is not resonant, its feedpoint impedance will be different, and the feedpoint and feedline will no longer be matched. Then part of the energy will be reflected back into the feedline towards the transmitter.

For a receiving antenna operating under similarly matched conditions, the received-signal energy fed to the feedline from the antenna will all be accepted by the feedline for routing on to the receiver. In an unmatched condition, part of the received-signal energy is reflected back from the feedline

into the antenna.

So, when using a resonant-antenna design with its appropriate-impedance feedline, we get more transmitted signal out to the antenna and more received signal in to the receiver. This generally makes for better communications. It also avoids something called "standing waves" on the feedline.

High levels of standing waves (known as a high SWR) lead to losses by converting signal energy from the transmitter into heat. This can damage or destroy the lines when transmitting if high power is used. Especially for some designs an antenna's gain can suffer if a resonant design is operated off resonance. And at significant departures from resonance, the shape of some antenna's radiation and reception patterns can also be affected.

### ■ This Month:

Did you notice that the above answer said that matched conditions *generally* make for better communications? This implies that sometimes matched conditions between antenna and feedline don't necessarily improve communications. How could this be?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. Til then Peace, DX, 73

# NEW!

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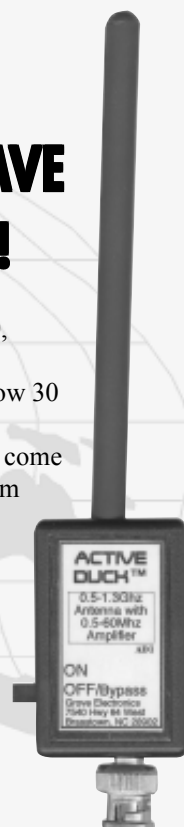
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## The First A.C. Sets

Last month's column was devoted to the battery radios of the 1920s. We took a detailed look at examples of the two dominant designs of the period: a regenerative receiver and a TRF (tuned radio frequency) "3-dialer." Finally, we touched on the newly-introduced superheterodyne design, which was then marketed only by RCA. The next major innovation would be introduction of "plug-in" radios that required no batteries but drew their power directly from the alternating current (a.c.) line via a wall socket.

### The Annoyance of Batteries

Imagine, if you can, the annoyance and expense of operating a power-hungry 5-tube "3-dialer" on batteries. The filaments of the 01-A tubes were usually lit from a lead-acid auto-type storage battery. This had to be recharged from time to time – which required disconnecting it and dragging it bodily down to the neighborhood service station. Not only that, but the tiniest unnoticed spill of its sulfuric acid electrolyte would wreak havoc with floors and rugs.

When we had the upstairs floors of our old (1875 era) home stripped, the removal of the darkened varnish revealed a blackened spot near a front bedroom window. The floor sander told us that he had seen this in many old homes over the years, and that it was caused by battery acid from the old radios. This was not a feature that would exactly endear itself to the housewives of the period! But I never look at that spot without trying to imagine what kind of radio occupied the space back in the roaring 20s.

Besides the rechargeable car battery for the tube filaments (known as the "A" battery), these radios required one or more dry batteries for plate (or "B") voltage and, often, an additional "C" battery for grid bias on the final audio stage. The dry batteries were not rechargeable; when they were exhausted you threw them out and bought new ones. Is it any wonder that radio manufacturers were racing to market the first plug-in sets?

### Battery Eliminators

The consumer's first opportunity to ditch his batteries came in the form of the "battery eliminator." As its name implies, it was an

accessory for the original radio rather than a replacement for it; it plugged into the wall and replaced the batteries. "B" and "C" eliminators were more common than "A" eliminators, which were even bulkier (and more costly) than the car batteries they replaced. The "B" and "C" eliminator was usually a single unit that provided the multiple voltages required. On its panel were a group of binding posts to supply the voltages and a group of knobs or sliders to set the voltage at each post to the required value.



**FIG. 1.** *Atwater Kent Model 42 is a good example of an early (1927) plug-in set. It used a separate speaker just as did the early battery sets. Note uncluttered front panel.*

The eliminators certainly side-stepped the long-term fuss and expense of the batteries, but they were just as clumsy and unsightly. They had to be hooked up to the radio using the same tangle of wires as the power sources they replaced, and the typical set installation still looked more like a laboratory experiment than something that would grace a living room.

The first sets specially designed for wall socket power began appearing on the market in the late 1920s. They were made possible by the introduction of a new range of tubes that could be lit by alternating current – thus eliminating the need for an "A" battery or a clumsy "A" eliminator. The "B" and "C" voltages could then be supplied by a compact integral power unit mounted right inside the radio cabinet and, of course, permanently wired into the radio circuitry without a tangle of external cabling.

Let me take a moment to discuss the new tubes because, first of all, they are interesting; secondly, a knowledge of these tubes will help you identify radios from the early

"plug in" period when you come across them at swap meets and flea markets. In fact, throughout this series on radio development, we'll need to pay as much attention to the new tube types as the sets they made possible. Radio innovations were frequently driven by innovations in vacuum tube technology.

### The New Tubes

If you tried to light the filaments of the 01-As in a battery 3-dialer from alternating current (the type of power that served most 1920s homes and still serves most homes today), the result would be a loud hum in the speaker. That's because the thin filaments of the 01-As would rapidly heat and cool in sync with the a.c. supply – alternately interfering with the action of the tube and then allowing it to resume.

The first approach to designing a tube that could be lit on a.c. was to make the filaments much heavier. Then, because of the greater "heat inertia," the cycles of the a.c. line would be smoothed out and not allowed to be reflected in the output of the tube. The result was the type 26, whose hefty filament drew over an ampere of current – more than four times the current of the 01-A – at a voltage of only 1.5 compared to the 01-As five volts. The extra current draw would have been a problem with battery power – but didn't matter with the limitless (in comparison) power available easily and inexpensively from the wall socket.

The first commonly sold a.c. sets were TRF designs not very different electronically from the "3 dialers." The three 01-A radio frequency (RF) amplifiers were replaced by type 26s, as was the first stage of audio amplification. The second stage of audio amplification, sometimes called the "power amplifier" was usually occupied by a type 71-A.

The 71-A was actually designed for battery set service to meet the need for a more potent audio output (second audio) tube than the 01-A. It has the same 5-volt, 0.25 ampere filament as the 01-A. By the time it was introduced, battery sets were on their way out; I've never found a battery set with a 71-A in it. However, it turned out that the tube worked just fine as a second audio tube in a.c. sets – even with a.c. on the filament. Since

most of the RF and AF (audio frequency) amplification took place before the signal reached the 71-A, the “signal to hum” ratio made any introduced hum almost unnoticeable.

However, neither a battery tube nor the new a.c. 26 would work hum-free at the critical detector position. A whole new tube type had to be designed for this, and the result was the type 27. Instead of relying on filament “heat inertia” to quell the hum, the filament was taken completely out of the signal path. Instead, it was used just to heat a surrounding element called the “cathode,” which in turn emitted the electrons required for tube operation. The cathode had far more heat inertia even than the 26 filament and the new tube ran quietly in the detector socket.

A vocabulary point you should be aware of is that the filament of a tube having a cathode is usually called a “heater.” Curiously enough, at 2.5-volts, 1.75 amps, the 27 heater has completely different power requirements than the 26, 01-A or 71-A. However as radio design evolved, heaters became standardized at 2.5-volts – until the need to design radios to operate in motor vehicles called for the release of 6-volt tubes.



**FIG. 2.** Interior of the AK 42. Power supply is oblong box at bottom of picture.

### ■ An Early A.C. Set

When the first a.c. sets hit the market, the battery sets were relegated to the alley or trash can about as fast as the 386 and 486 computers were when the pentiums came out. In fact, I think there are a lot of parallels between the explosion of radio technology in the 20s and 30s and the explosion of computer technology in the 80s and 90s. But that’s a story for another column!

As an excellent example of an early a.c. set, I’d like to present the Atwater Kent Model 42, released in 1927. It is of the TRF design already discussed, using three type-26 RF amplifiers, a type-27 detector, another 26 as the first audio amplifier and a 71-A as the second audio, or audio output stage. Note from the photo that the set is housed in a

squarish metal box instead of the long wood “coffin style” cabinets typical of the predecessor battery sets. However, like the battery sets, it used an external accessory speaker instead of a built-in one.

Looking at the close-up of the interior, you can see the radio deck at the top of the picture and the power supply at the bottom. At bottom left, just behind the antenna and ground terminal strip, is the heavy power cable running from the power supply to the set proper. At the right of the power supply box, you can see the rectifier tube – which does the initial part of the job of changing the a.c. from the house wall socket into direct current suitable for use as a “B” and “C” supply. The tube is a type 80, which was probably made over a longer period of time, and in greater quantity, than any other vacuum tube used by American radio manufacturers.

Also worth mentioning is the simplicity of the front panel as compared with that of the “3-dialer.” The three tuning capacitors, now ganged by pulleys and metal bands, are controlled by a single knob. That’s the knob you see at the left of the panel; the smaller knob just beneath it is a friction-drive vernier control. The filament rheostats, now patently unnecessary, are also gone. In their place is a single volume control (to the right of the tuning knob). Below the volume control is a horizontally oriented toggle “on-off” switch that controls the a.c. power.

In closing, let’s take a quick peek at just one more example of an early set. It’s an RCA Radiola 60, which was released in 1928 – about a year after the AK42. We won’t delve into its circuitry except to say that it’s a superheterodyne model and – except for the 71-A power amplifier and the 80 rectifier – that it uses type-27 tubes throughout (seven of them!). One reason RCA may have avoided using the 26 was to avoid having to arrange a special transformer winding to light the 1.5-volt filaments. As it was, 2.5 volts had to be provided for the 27, 5.0 volts for the 71A, and an independent 5.0 volt winding was needed for the 80 rectifier.

I’ve always scratched my head about the cabinet design RCA chose for this set. During the battery set era, the company was known for its innovative and unusual cabinets. Yet this early entry into the a.c. market had a long, coffin-shaped wood cabinet remi-

niscant of the most pedestrian battery-era designs. By now, many a.c. manufacturers had switched to metal (perhaps because of its

lightness; perhaps because it better dissipated the heat from the power supply) – and the cabinets tended to have a square footprint because the power supply was tucked in back of the radio deck proper. Unfortunately, you can’t see the inside of the Radiola 60 cabinet in the shot I’ve provided – but the power supply unit is mounted in line with the radio deck instead of be-

side it, making for the long, skinny footprint.

Savvy readers will have noted that Fig 1 in the January column was reversed; hope it didn’t cause too much confusion. In April we’ll look at the further evolution of radio design as manufacturers sought to cut costs and make production more efficient.



**FIG. 3.** RCA Radiola 60, an a.c. superheterodyne of 1928, used a retro cabinet design.

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# Can Software Simplify the AR-8200?

In my career as businessman/technologist in the electronics and computer industry, I must constantly remind myself and my team that people buy products. When we lose sight of that simple fact the overwhelming urge for technical complexity can quickly take control. A product can be clearly technically superior to anything on the market but still be so complex few people want climb the steep/long learning curve required to use it. Sure, a few zealous followers will buy it. But the result is still an ergonomic nightmare, and, therefore, a market failure! No – the most technically advanced products are NOT guaranteed commercial success.

After spending many weeks on the AOR AR-8200 and three programs which can provide a measure of computer control for this radio, I am one hobbyist who is tired, disgusted and disappointed.

The AR-8200 certainly has impressive specifications with its wide frequency range (55 kHz to 2040 MHz), modes (WFM, NFM, SFM, WAM, AM, NAM, USB, LSB, CW), and 1,000 memories – all in a portable scanner package! I have been anxious to get my hands on one of these for a while. In addition, the AR-8200 has a serial port that can be connected to a computer. It sounded perfect.

## ■The Naked AR-8200

Before I began using the computer programs from AOR, BuTel and Scancat for the AR-8200, I tried it *sans* computer. I soon found out that this was no easy task. With its 16-key multi-level functioning keypad, thumb wheel, function switch, four position up/down/left/right scroll switches and a large liquid crystal display with confusing graphics I could not believe that this made it to the market. Was the AOR marketing department all away on vacation when the AR-8200 was being designed? Or did marketing not have an input to the product? Either way, a 22-section, 140-page instruction manual is a signal that something is out of control.

For someone like me who is in the radio hobby to hear far away places, participate in eyewitness reports as they happen, experience the excitement of unexpected intercepts, and for pure enjoyment, a 140-page instruction manual and a forest of keys don't jive.

Standing at the gates of Nellis Airbase, with a flight of F-15s, F-16 aggressors and

three Thunderbirds going over my head with the soundless AR-8200 in my hand, I longed for a simple Radio Shack scanner.

"This radio is in desperate need of computer control!" I screamed in frustration as the fighters performed an overhead break and touched gracefully down on runway 22 right.



Fig. 1. ARC8200's Fastlog Screen

## ■Computer Power Workshop

That night at the hotel, I attached the AOR 8200 to PC serial cable to the radio. Then I loaded my Pentium 166 MHz, MMX laptop, running Windows 98, with AOR's **CC8200 Computer Control v.1.01** CD ROM.

The AR8200 Workshop folder appeared in my Programs list. The AR8200 Tuner program is the main control program. Although awkward to navigate and having poorly described menus, Tuner does make radio memory management much easier. Active frequencies can be obtained via a Search and Log function. This data can then be sent to one of the radio's memory banks. These banks can be scanned and modified from Tuner.

The radio's operating functions, such as beep level and LCD brightness, can be controlled from the AR 8200 Tuner program. Although I searched for hours, I could not find a way for the computer to control the AR8200 directly. Instead, all frequencies have to be uploaded to the radio's memory before they can be scanned. This limited the number of frequencies to 1000 and wasted lots of needless time up/down loading.

With a cost of over \$400 dollars, you

would think that the receiver could be operated as an expanded function fixed radio via computer. This would make the AR8200 very valuable as a fixed, as well as portable receiver. AR8200 Tuner did lots of neat things, but did not address the direct computer control capability.

## ■Changing Toolboxes

The **ARC8200 ToolBox** program from BuTel in the Netherlands is a similar program to AR8200 Tuner. Although it also did not allow scanning by the AR8200 directly from a computer file, it had some very useful and unique utilities.

The "Fastlog" program is great for searching and storing new frequencies. See Figure 1. It scanned the entire civil airband (118 - 136 MHz) in less than 48 seconds. It grabbed and logged five active frequencies in its first scan. After 5 minutes of Fastlogging, 46 frequencies had been stored to the log file. Using Tool Box's Memory Bank Manager log files can be converted to files that can then be sent to the radio's memory banks. Then they can be scanned from the radio's keyboard.

A simple, but effective screen displays the number of active frequencies captured as the search continues. This is one of the easiest, automatic and effective search programs I have ever used. This is the way computers should be used by radio monitors – to make things simpler!

The Memory Manager can be used to convert other word processing, spreadsheet and database files to AR8200 memory files. The operation is easy and very useful for frequency files taken off the web or, for example, from the electronic *Monitoring Times Express*. But a bit of care is required. Strange things happen if you don't make sure that the new file length is less than the memory bank length. For example, if you are trying to convert a frequency file with 72 entries, expand the intended memory band size to *greater* than 72. This is done from Memory Banks Manager's Setup, then Bank Size menus.

One program included in ARC8200 ToolBox is VFO (variable frequency oscillator) Control. Is this the longed-for computer control program for the AR8200? No. The VFO Control program sets the A and B VFOs to their frequencies. The only method is via an on-screen keyboard. No computer-based,

database scanning provision here, either.

It strikes me that linking this with the existing Memory Banks Manager to provide real computer-based control of the AR8200 should not be that difficult. So near, and yet so far!

ARC8200 Toolbox provides other features, including the ability to read the serial number of your AR8200 and finding its capabilities (See the BuTel website for details). If you have an AR8200 you should check out the BuTel website for a full description.

Both ToolBox and Workshop also provide computer-controlled and displayed spectrum analysis functions.

## The Cat gives it a try

As a last ditch effort, I turned to the latest version of ScanCat from Computer Aided Technologies. This is one of the granddaddies of computer control. It now claims to control almost all computer port radios. I was originally drawn to ScanCat many years ago because of its intuitively simple user interface. Functions and commands were "clean" and obvious in the early days.

I loaded the latest *ScanCat*, version 7.50, Surveillance Enhanced, Platinum edition. (Once the words *ScanCat Version x.x* said it all. Why is a simple title not good enough anymore?)

The first thing that was obvious was that a running ScanCat used *much* more of my computer's resources than the other AR8200 programs. MS Word, which I use for writing this column, ground to a halt when ScanCat was running. Typed letters appeared on the screen up to 7 seconds after the key was pressed!

I then set up ScanCat to scan the 118 to 136 MHz range, as we did with Fastlog. I chose the autolog (checking for dupes) function and a step of 12.5 kHz. These were the same parameters used in Fastlog.

The results substantiated the fact that ScanCat is one lazy cat. ScanCat took almost three minutes, as compared to Fastlog's 48 seconds and Tuner's one minute! During the five minute search, ScanCat only found eight active frequencies as compared to Fastlog's forty-six logged frequencies. These tests were done within minutes of each other.

On the other hand, ScanCat does allow these intercepted frequencies to be stored in a database file from which they *can be scanned* under computer control. This allows almost instant and unlimited frequency scanning. See Figure 2. ScanCat comes closest to given the AR8200 owner fixed and portable receiver capabilities.

Looking around ScanCat's screen, a number of user variable parameters are seen. If I had played with them for a hour or so could I have equaled Fastlog's results? Perhaps. But that misses the point of computer controlled monitoring: simplicity and enhanced enjoyment. I also noticed poorly described buttons such as "tweak" on the ScanCat screen. These really don't make for a simple, clear user interface.



Fig. 2. Scancat SE making it happen

Of course, keep in mind that ScanCat tries to accommodate almost every radio on the market. This may add to its screen complexity, user "fiddle" bars and slow radio interface, not to mention the 140-page instruction manual.

## Where and How Much

*AR8200 Workshop* comes free with the AOR AR8200 and requires Windows 95/98.

*ARC 8200 Toolbox* will run on a 486 or higher and is available from [www.butel.nl](http://www.butel.nl) for \$63 (outside EC).

*ScanCat SE* requires Windows 3.1 or newer, 8 Meg of RAM and 5 Meg Hard Drive space. Priced at \$159.95 you can check [www.scancat.com](http://www.scancat.com) for dealers.

## Simple IS Better

A simple business dictum says that a product cannot be all things to all people. If it attempts this impossibility, it will "master none."

In order to get a valid result, a focus group testing of a product should be performed with a random sampling of users. A cross section of existing, new, experienced and inexperienced users should be utilized for a balanced, unbiased view. But, in some cases, technologists think they know best and try for a universal product. I think we have come full circle back to the "more is better" delusion.

The majority of the Email I receive bemoans the fact that computer aided monitoring is not simple. Albert Einstein once said that if a person knows a subject he can convey its essence to the uninitiated in less than 100 words. Here was a true KISS (keep it simple stupid) believer.

Simpler is technical elegance and the mark of a truly professional programmer or technologist. Achieving more using less is true brilliance. Can this new higher level be achieved by receiver control software programmers? The height of the bar has been set. Any takers?

## GPS on PalmPilot

Next month we'll see if a simple devices such as the PalmPilot III from 3Com can be used as a GPS (global positioning satellite) controller. The Delorme Earthmate and their PalmPilot software will be given the once-over. Is this simple platform really up to the job? Also, what's has been happening to Windows CE since my scathing column of a few years ago? We'll see next time.

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## Palm's Handy IIe

Anyone who is serious about the radio hobby finds out quickly that there is a crying need for organization. The very act of listening tends to generate lots of data: lists of favorite frequencies, records of memory presets, logs of information collected off the air, records of test transmissions, and so forth. It's a challenge to keep it all straight and accessible.

In my personal quest to reduce some of the clutter in my life, I decided to experiment with some of the PDA (personal digital assistant) devices that are available. For several years now, the Palm PDA has been making a name for itself as a Cool Toy among the digeratti, and now Palm organizers are the market leaders.

The popularity of the Palm organizers is no surprise. The good folks at Palm were the first to figure out that the smaller you make an electronic pocket organizer, the smaller you have to make the keyboard. Pretty soon, the keyboard becomes so small as to be unusable. So, the Palm designers did away with the keyboard and instead equipped the Palm organizer with a pen-like stylus and Graffiti Power Writing Software that does a kind of rudimentary handwriting recognition. Users enter a letter at a time using a special character set. The software then translates it into letters on the screen.

In addition, the Palm was among the first organizers to have a really good, really easy data link to a personal computer.

### Sizing up this Palm

The Palm IIIe that I tested measures on 3.25 inches wide by 4.75 high by approximately about .75 inches thick. The size is just right for easily slipping into a shirt pocket. The case has a clamshell design, a bit like a communicator on Star Trek. The flip-down cover protects the display from damage, but the cover can be removed if you want to use the Palm with any of the optional leather cases that are available.

The liquid crystal display screen is about 2-3/8 inches square. There is a wheel on the side for adjusting contrast, but the display is not as crisp and "contrasty" as some I have seen. In addition, the backlighting is, well, different. Instead of illuminating the background of the display to provide contrast for

the lettering, the letters on the screen appear to glow. It takes a bit of getting used to, but works satisfactorily well.

At the bottom of the screen is a small area for entering handwritten letters and numbers using the stylus. Around the writing area are four touch sensitive pads for activating other functions. At the bottom edge of the front panel are five plastic buttons for various functions, plus a power/backlighting button.

On the back of the case is a slot for storing the stylus, an infrared communications port, a reset button, a contrast control wheel, a door for accessing the two AAA alkaline batteries, and a door that slides out of the way when the Palm IIIe is inserted into its docking cradle for synchronization with a PC.

### Give the Palm a hand!

There is a lot to like about the Palm IIIe. The software that installs on the PC works well for organizing personal information, and the synchronization process – making sure that the information on the Palm is the same as on the PC – is extraordinarily easy. Even the set-up is very, very easy.

The documentation is clear and well written. So, if you want to write up a frequency list on your personal computer and then load it across to the Palm for later reference, you'll find the entire process almost effortless.

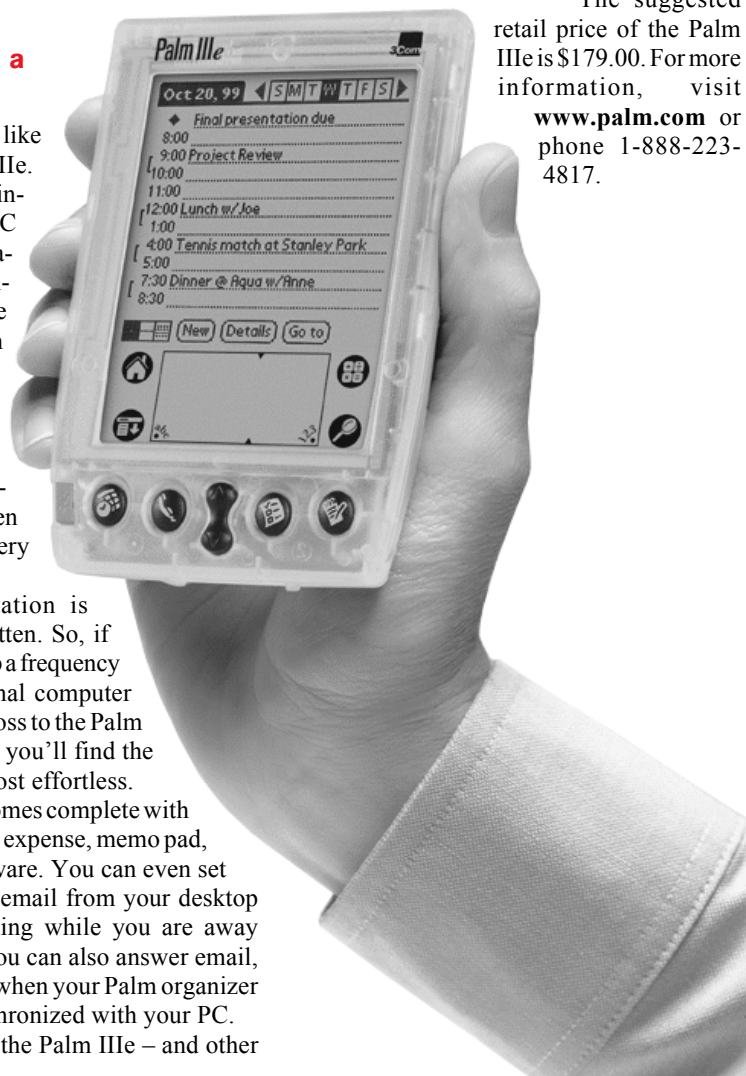
The Palm IIIe comes complete with address, date book, expense, memo pad, and to-do list software. You can even set it up to download email from your desktop computer for reading while you are away from your desk. You can also answer email, which will be sent when your Palm organizer is once again synchronized with your PC.

What truly sets the Palm IIIe – and other

members of the Palm organizer family – apart from other organizers are the extensive libraries of software that are available. Simply visit [www.palm.com](http://www.palm.com), click on web resources and you'll be astounded at the amazing variety of programs that are available for Palm organizers. These range from astrology programs to stock-trading software that works with cellphone linked Palm organizers.

Tomas Hood, NW7US, has written an HF logging program and a Morse trainer program for the Palm organizer, and you can find these by visiting his website <http://hfradio.org>. If you want the ultimate in software flexibility for your personal digital assistant, the Palm organizer is clearly the way to go.

The suggested retail price of the Palm IIIe is \$179.00. For more information, visit [www.palm.com](http://www.palm.com) or phone 1-888-223-4817.





# LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS

## Hard copy or *MT Express*?

I'm trying to decide whether, when I renew, to get the electronic edition or the paper. Since my wife discourages stacks of magazine back issues I am thinking very seriously of going electronic and putting the PDF files on a CD-R. Ease of search would be nice ... I've tried several searches on the free August issue.

As usual *MT* has done a good job of being the leader in a movement. A happy subscriber,

— Ron Biddle

Thanks for the kind comments, Ron. I offer another alternative to your dilemma: Subscribe to the paper version during the year and then purchase the year on CD when it becomes available. You'll get a discount as a subscriber. (see page 19 for details) The CD will enable a search of the full year, instead of having to open each individual issue of *MT Express* to search for a desired topic. And then you can donate your paper copies to a local radio club or library to help inspire other potential radio hobbyists.

## Now that LPFM licenses are allowed...

"...will *MT* start a regular column featuring all the various microbroadcasters? Good luck tracking them all down... that will definitely become a reader send-in! It will make interesting reading.

"In the long term, I believe it is interesting – or better said, remarkable – that in an environment of restrictions, this may/will come to pass ... As a result of this FCC agreement, local spokespersons/broadcasters will have the opportunity to coordinate the actions of a large body of 'private listeners'...

"In time, this may serve to group us back together again, reminiscent of 'town meetings.' The resulting societal bonding that is bound to occur as a result of these improved and somewhat personal communications will, hopefully, make us a more pro-active society, inspired not just by what Corporate America wants us to hear, but by what our neighbors' needs/pains/ joys and enthusiasms are all about. By whom would you rather be motivated?...

"We're in for some fun, now!"

— Paul Forel, L.A., CA

As low power FM stations begin to be licensed and get on the air (see **Communications**), we certainly expect our readers to send in their reports. Whether they will warrant a column of their own remains to be seen. It would be appropriate to send reports of new license grants to **American Bandscan**, transmissions monitored to **BC Loggings**, and verifications received to the **QSL Report**. (Now *those* will be something to keep for posterity!)

## Thanks for old-time radio

"Thank you for starting the **Radio Restoration** column in *Monitoring Times*. I was quite surprised when I saw your article in the January 200 issue.

"I have been collecting plastic radios from the '50s for about three years and it has been a rewarding hobby but also very frustrating because I had to learn from scratch about radio repairing. Not having a strong electronics background along with the lack of 'hands on' expertise prevented me from learning as much as I would like.

"Repairing radio information is scattered and hard to locate. Much of the information is general in nature and the old timers do not like parting with the knowledge. Please don't be offended by that statement but locally I've tried to hook up with a mentor and it failed. At one point, I was going to run an ad to find a radio repair expert to learn from!

"If you can in future articles, it would be appreciated if you tell me how to test IF cans (both input and output) as well as oscillator coils. Also, a good methodology of checking each stage in the classic All American Five design would be a big help.

"Looking forward to your articles."

— Nick Terrence, via email

## More on the mystery antennas

The mystery antenna site from Sept '98's **Letters** was fairly thoroughly described and resolved in the January column. Here's part of a later response from an *MT* subscriber:

"The site at Corrine, Utah, is run by TCI/BR Communications in Sunnyvale, CA. It is used for ionospheric / propagation studies and support in conjunction with several educational institutions and government agencies." Check out the company's website at [www.tcibr.com](http://www.tcibr.com)

## Inter-agency frequencies

"The January **Scanning Report** mentioned that New York wishes to have an inter-agency coordination frequency.

"According to my *Police Call* directory one has been assigned on a national basis – 155.475 National Law Enforcement. I removed it from my scanner's memory because I never heard anything on it.

"In Rhode Island and Eastern Massachusetts we have two frequencies designated 'inter-city,' where one town's dispatcher can talk to another's police (158.970) and fire (154.280 MHz).

"No matter what frequency is chosen, most are not even in the same band with their sister agencies and would require personnel to carry a separate radio for their own band plus a

coordination frequency.

"155.475 is already allocated nationwide. Someone should use it."

— Paul Kelly, WB1ANJ, Rhode Island

Paul Kelly touches on a subject that has greatly puzzled us here at *MT* headquarters as well. We'd like to hear from our readers involved in public safety communications. Why is the national allocation rarely used? It appears many agencies aren't even aware of it, but is there another reason they don't use it?

When public safety agencies requested (and were granted) 24 MHz from television channels 60-69 being given back to the FCC for reallocation (see **Communications**), their arguments were that the bands were too crowded and they could not talk to each other. So we, too, ask, "why does no one use 155.475? Has everyone moved to UHF?"

We welcome your news and views at Letters to the Editor, PO Box 98, Brasstown, NC 28902 or email to [mtditor@grove-ent.com](mailto:mtditor@grove-ent.com)

— Rachel Baughn, editor

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## Uniden SC-200 Portable Scanner

Uniden's new SportCat 200 has a definite different appearance (fig 1). Its 24 keys are shaped like cat eyes and its LCD display is framed in bright blue. Beneath the feline appearance is a 200 channel scanner with alpha display, CTCSS and digital coded squelch, and a computer port. It is the first Bearcat portable to be offered with PL/DPL and alpha label features.

The SC200 comes standard with an earphone, detachable belt clip, helical antenna, and a computer cable fitted with a DB-9 connector. It tunes the conventional scanner bands in 5 and 12.5 kHz steps. AM and narrow FM modes are chosen automatically and cannot be overridden. The 200 channels are divided into 10 banks.

Each memory channel can be programmed with a frequency, a rescan delay flag, a scan lockout flag, an attenuator flag, and an alert flag. While scanning, the SC200 will emit a beep if a signal is found on a channel programmed with the alert flag. Unlike the PRO-92 we reviewed in January *MT*, the SC-200 detects duplicate channels.

You can also program a 10 character label for each channel. Labels may be comprised of upper and lower alphabetic characters, digits, and punctuation. A CTCSS (PL) or digital coded squelch (DPL) code may be entered on a per channel basis as well. If a channel is programmed with a PL or DPL code, the display flips back and forth between the code and the frequency or label.

### Scanning and Searching

Like most Uniden models, the SC200 can scan various combinations of the 10 memory banks and lock out individual channels from being scanned.

You can designate one channel in each bank as a priority channel and the priority channels can be checked for activity every 2 seconds.

There are 12 preprogrammed search bands

and one pair of user programmable limits. The VFO search mode lets one type a frequency on the keypad, without writing it to a memory channel, and use the click stop tuning knob to tune up or down manually, one step at a time.

### Performance

Our SC200, serial no. 96004023, works well in actual use. The top mounted concentric squelch and volume knobs are much easier to use than pushbutton controls found on micro-sized models. The three green LEDs used to light the display do their job well. If enabled, an Auto Light feature lights the display when receiving a signal.

The audio is crisp and clear. There is a very slight hiss in the speaker and earphone when the SC200 is squelched. The hiss is independent of the volume control setting and the level is too low to be annoying.

There is a noise burst of approximately 40 milliseconds duration at the end of each transmission. Some people may find a long squelch tail annoying, but does 40 ms. constitute a long tail? In order to help readers compare squelch tail lengths, we measured the squelch tail duration of several scanners under the same conditions (see chart).

We programmed each scanner to 155 MHz, disabled PL and DPL, and adjusted the squelch control to a reasonable setting past the threshold. We injected an unmodulated, 1  $\mu$ V RF signal at 155 MHz into the antenna jack. We used an oscilloscope to observe the scanner's audio output at the headphone jack while turning the RF signal on and off.

The included AT-218 antenna is 6-1/2" long, fitted with a BNC connector and appears identical to the antenna supplied with the BC245XLT. It is too stiff, but "hears" better than our Prime RD-9 dual band antenna and the longer antenna supplied with our Yaesu VR-500.

The operating guide states the SC200 uses triple conversion circuitry but doesn't

specify the IFs (intermediate frequencies). Lab testing reveals IFs of 380.7, 10.85, and 0.45 MHz. Our SC200 rejects 1st IF images quite well, though we occasionally hear 2nd IF cellular images 21.7 MHz below their carrier frequency when driving past a cellular base transmitter.

### Measurements Uniden SC-200 Scanner S/N 96004023

List price \$249.95  
Uniden America Corp.  
4700 Amon Carter Blvd.  
Fort Worth, TX 76155

#### Frequency coverage (MHz):

29 - 54 (5 kHz steps)  
108 - 137 (AM, 12.5 kHz steps)  
137 - 174 (5 kHz steps)  
406 - 512 (12.5 kHz steps)  
806 - 823.9875, 849.0125 - 868.9875,  
894.0125 - 956 (12.5 kHz steps)

**Attenuator:** 3 dB @ 40 MHz, 10 dB @ 155 MHz, 27 dB @ 460 MHz, 11 dB @ 860 MHz

**FM modulation acceptance:** 12 kHz

**Intermediate Frequencies:** 380.7, 10.85, 0.45 MHz

#### Image rejection due to 1st IF:

60 dB at 155 MHz, 39 dB at 460 MHz, 89 dB at 860 MHz

#### Image rejection due to 2nd IF:

33 dB at 155 MHz, 34 dB at 460 MHz, 31 dB at 860 MHz

#### Audio output power at earphone jack:

130 mW @ 10% distortion into 8 ohms

**Squelch tail near threshold (1  $\mu$ V @ 155 MHz):** 40 ms.

**Practical memory scan speed:** 72 ch/sec.

**Search speed, Turbo:** 305 steps/sec.

**Search speed, regular:** 100 steps/sec.

**Current consumption at 4.8 VDC:**

off - 0 mA

manual - 67 mA

scan - 68 mA

full volume - 147 mA

lamp - 60 mA additional

**Battery saver:** after 55 sec. in Manual

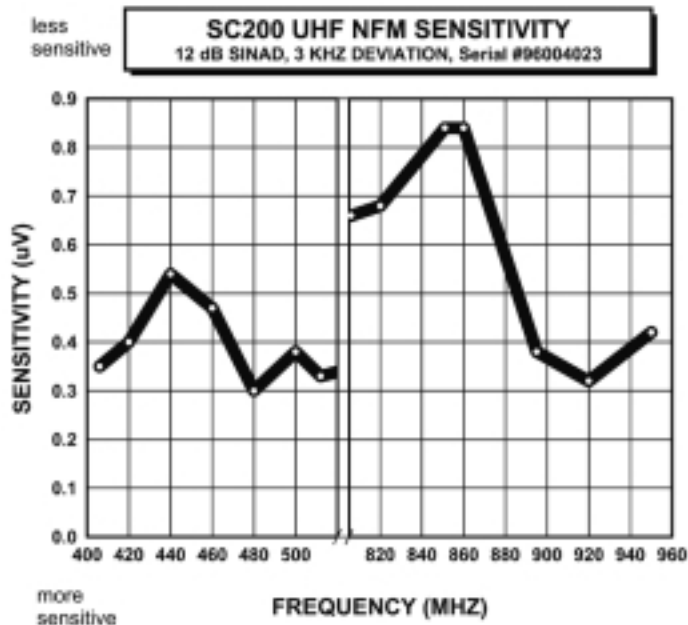
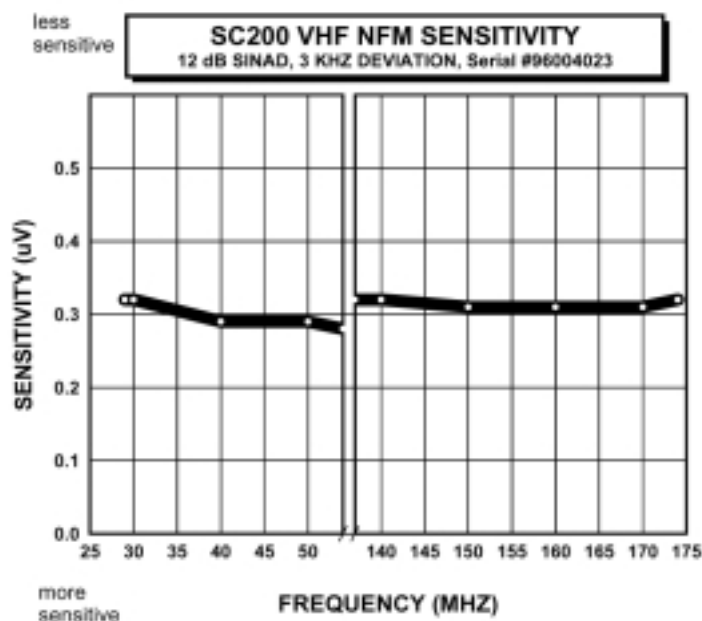
Low battery warning at 4.5 VDC or less  
Shutdown at 4.3 VDC or less



Fig. 1.



Fig. 2. Tamper resistant epoxy underneath linear board



We found only 11 birdies strong enough to break squelch: 41.6, 407.7625, 407.8125, 413.175, 413.225, 507.25, 823.8, 899.2375, 906.4125, 906.5875, and 926.7 MHz.

Our SC200's attenuator provided between 3 and 27 dB loss, depending on the band. That's quite a wide range. Being able to enable the attenuator on a per channel basis is an advance over the BC245XLT.

Inside, the two circuit boards are neatly assembled. A large portion of the linear board is potted to prevent tampering (fig. 2). A surface mount MC3361CD IF/detector chip is unencumbered by epoxy, making it possible to tap the discriminator output at pin 9.

## Sports ++

Don't be put off by the playful appearance and SportCat label. The SC200 is a serious scanner and a good value at a street price under \$200. The PL/DPL squelch, alpha display, computer port and cable, and robust audio make this a "keeper." We wish it had more channels and used AA batteries.

## MetroWest NiMH Battery Pack

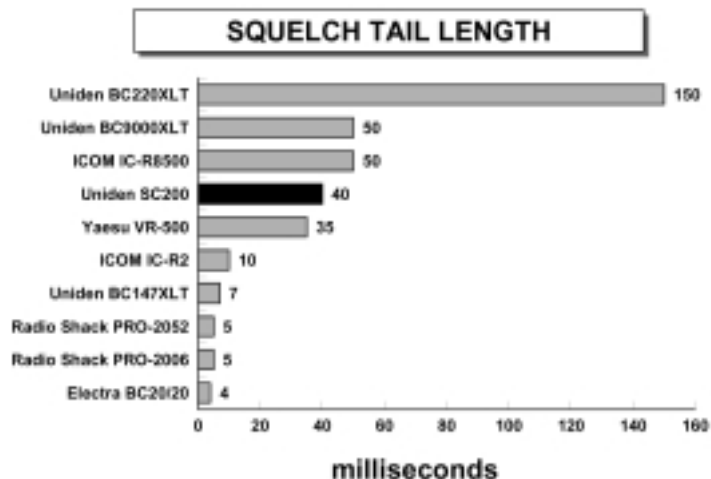
Several Uniden portable scanners, including the BC245XLT and SC200, are furnished with a BP-180 800 mAh NiCd battery pack. For more operating time between charges, we power the SC200 with a

MetroWest 1500 mAh NiMH (nickel metal hydride) pack which is rated at almost twice the capacity of the BP-180.

The NiMH pack can be recharged while

radios we reviewed in November and December 1999 MT:

"When I heard that Uniden was coming out with these models, I was really looking forward to clearing some of the clutter off of my nightstand next to the bed. However, I was quite disappointed when I took a look at the scanners. I noticed that the display is flat. In other words, you need to be well above the scanner to see the display. This is totally useless for someone who wants to be able to look over and see what the time is from their bed as with a traditional bedside clock radio. Uniden should have made the display vertical *a la* the BC895XLT or the old BC210 models so that the clock could easily be viewed..."



Notes:  
One sample of each model tested.  
Produced by a 155 MHz, 1uV unmodulated signal.  
Squelch control set beyond threshold in NFM mode.

Copyright 1999, Bob Parnass, AJRS

inside the SC200, but that takes 24 to 28 hours because a resistor inside the scanner limits the charge current.

For more information, contact MetroWest Inc., 822 N. Spring, LaGrange Park, IL 60526, tel. (708)354-2125 or visit their web page, [www.metrowestscan.com](http://www.metrowestscan.com)

## Uniden Scanner Clock Radio Ergonomics

Don Young, N2DY, writes about the BC278CLT and BC248CLT scanner clock

The SC200 is available for \$199.95 plus \$12 s/h from Grove Enterprises (800-438-8155).

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## The MFJ-784B Tunable DSP Filter

There's a world of noise and confusion out there and I'm not talking about the election this year: I'm talking about the HF spectrum. Somewhere, amidst the din of clashing electromagnetic waves, is the signal you're trying to tune in.

Most of us have radios with, at best, built-in ineffective noise blankers which do little to combat the layers of reception degradation. What can we do to get some relief? Isn't there some sort of caped radio crusader to come to our aid?

Well, you can put away those tights, because help has already arrived in the form of MFJ's Model 784B Tunable DSP Filter. This compact digital signal processor (DSP) filter can sort through everything but your laundry to help tune in what you're trying to hear. It will help take some of the frustration out of shortwave listening and HF amateur radio operating.

Many new, sophisticated shortwave radios and amateur radio transceivers have DSP filtering built in, but, for the tens of thousands of us whose gear doesn't include such amenities, our hobby is a little more arduous. The idea of expanding into more exotic modes may seem futile. But, before you surrender and take up collecting Beanie Babies® consider investing in the MFJ-784B.

### ■ How the 784B Works

Any time you shell out \$250 for a radio add-on you ought to get something to play with. MFJ understands this and the 784B has no fewer than five knobs (including a 10 position filter switch), nine pushbuttons and two multi-purpose LEDs. And that's just the front panel! But, there's more: MFJ has also made it possible to get inside the product and fiddle with jumpers to make even more variations possible. In fact, there are so many things you can do with this unit, I'll bet few have actually done them all. Anyway, here's how it works.

The heart of the 784B is a 16 bit 12 MHz processor built by Analog Devices which converts the analog signal from your receiver to digital information. It does so by sampling the audio from your receiver thousands of times per second with an analog-to-digital converter. This audio signal is then fed into the processor chip along with the various filter settings from

the front panel (or internal jumpers) and sent to a digital-to-analog converter which is fed to the audio amplifier stage of the filter and sent (finally!) to a speaker or line-out connection.

That's enough about the internal workings of this thing. Does it actually work? And how!



### ■ Pushed to the limits

On the weekend I tested this model, the bands were wide open. There were amateur HF contest enthusiasts jamming the ham bands, international broadcasters coming in like AM locals, and digital modes on nearly all frequencies in between. I went first to the ham bands to check out the perennial problem of CW operators on top of each other; tuner-uppers on net frequencies, and well-financed operators running full power less than 2 kHz from small-time operators.

Separating CW signals was easy once I got the hang of tuning the filters; tuner-uppers simply disappeared from net frequencies at the touch of a button, and, from my location on the East Coast I heard stations on 80 meter phone from as far away as Mexico and British Columbia!

Tuning in digital modes without the aid of a DSP is tedious. The MFJ-784B makes it much easier to tune in weather charts and weather satellite photos by simply setting the filter switch to the appropriate mode and tweaking the tunable filter knobs and noise reduction control.

The factory pre-set HF Packet filters are set for 170 Hz shift, 300 baud HF Packet signals. The RTTY and AMTOR filter is similarly set, but can be reset to other parameters. The SSTV/FAX/WEFAX filter is set so that it allows two separate frequency groups to pass through the filter for sync tone and vertical interval signal tones, but it cannot be reset. The front panel noise reduction filter can attenuate random noises from zero up to 20 dB when it's fully engaged.

### ■ Setting Up for Action

Setting up the unit for shortwave listening (SWL) or casual ham operating is easy. The extensive, well-illustrated, 56-page manual has a two-page "Fast Start" section up front for those who just can't wait to use the product.

The 784B does not come with a power supply but does have a power cable designed for use with a 12 volt power supply. Its power requirements are minimal and you should be able to use it with the power supply you're using for your transceiver. If your receiver has a built-in power supply, avoid using poorly filtered "wall cubes" for the 784B which may introduce extra unwanted noise.

The other connections you'll need are from the speaker jack on the back of your receiver or transceiver to the "receiver audio in" on the 784B, and a speaker cord from the "speaker out" on the 784B to your own external speaker. This is a good opportunity to add a decent external speaker to your listening post. Most signals will sound better on an external speaker than on the tiny built-in speaker that came with your receiver. In addition there is an RCA "Filtered Audio Out" jack for line-out use, such as with a small amplifier/speaker system, the volume for which is not controlled by the MFJ-784B.

If you're using the unit in connection with a TNC (terminal node controller) for HF packet work you'll need the optional DSP Cable Pac (\$8.00) to connect the DSP filter to your TNC and your transceiver to the DSP via the Aux, Mic, or Acc relay output. This also allows the passage of the transceiver's side tone for CW and digital modes. All connections are thoroughly explained in the manual, but you'll have to make up the connector ends going into your radio and TNC yourself. This will involve some close-up work with a soldering iron.

When you have it all set up, expect to spend a few hours touring the HF spectrum and playing with the variety of settings possible with all the modes available. When turning the tunable filter knobs, it helps to make small adjustments and not just sweep quickly from low to high on these knobs. The setting you may need may be very narrow and you could sweep right past it. It takes a while to review the steps necessary to

set up for various modes, but with a little practice you'll soon know what you're doing.

After your initial session with the 784B from the "Fast Start" set-up, go back and thoroughly read the manual. It's packed with useful tips on using the advanced features and getting the most out of the DSP filter.

## ■ Extra Goodies

Most SWLers and hams will be happy to use this product straight out of the box. Those willing to get out a screw driver have many hours of tinkering satisfaction yet to enjoy. MFJ gives detailed instructions in chapter 4 of the manual called "Advanced Features," which shows how to save filter settings to built-in memory; how to use a CW "spotting tone" to find the center frequency for the CW filter and to measure the frequency of any audio tone between 300 Hz and 1000 Hz; how to change the aggressiveness of the Auto Notch feature; how to set the CW side tone filter and change the pre-set filters for RTTY, HF Packet, AMTOR, and PacTOR filters.

### *Filter specifications from the MFJ-784B Instruction Manual (Courtesy MFJ Enterprises)*

Filter	Left Control	Right Control	Attenuation <sup>7</sup>	Type
LR/HR <sup>1</sup>	LR: 200-2200 Hz	HR: 1400-3400 Hz	57 dB @ 75 Hz	FIR
BP	fc: 300-3400 Hz	BW: 30-2100 Hz	47 dB @ 60 Hz	FIR
2BP <sup>2</sup>	f1: 300-3400 Hz	f2: 300-3400 Hz	47 dB @ 60 Hz	FIR
CW <sup>3</sup>	fc: 300-1000 Hz	BW: 30- 700 Hz	47 dB @ 60 Hz	FIR
SSB <sup>4</sup>	fc: 600-1700 Hz	BW:1000-2500 Hz	57 dB @ 75 Hz	FIR
RTTY	Jumper Programmable		47 dB @ 60 Hz	FIR
HF PACKET	Jumper Programmable		47 dB @ 60 Hz	FIR
AMTOR	Jumper Programmable		47 dB @ 60 Hz	FIR
PACTOR	Jumper Programmable		47 dB @ 60 Hz	FIR
SSTV/FAX/WeFAX	Fixed @ 1050-1350 Hz and 1450-2350 Hz		45 dB @ 60 Hz	FIR
Manual Notch	f1: 150-3400 Hz	f2: 150-3400 Hz	40 dB @ 95 Hz	IIR
Manual Notch (CW mode)	f1: 300-1000 Hz	f2: 300-1000 Hz	40 dB @ 105 Hz	IIR
Multiple Automatic Notch <sup>5</sup>	Entire freq. range of the received audio		Up to 50 dB	LMS
Random Noise Reduction <sup>6</sup>	Entire freq. range of selected band-pass filter		Up to 20 dB	LMS

#### Notes

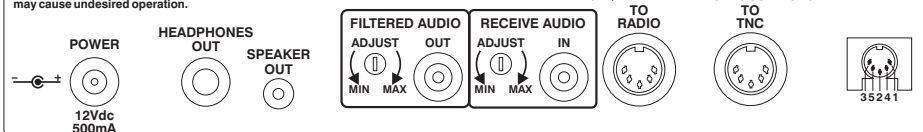
- 1 The **LR/HR** filter becomes a band-stop filter when **LR** is adjusted higher than **HR**.
  - 2 The **2BP** filter uses the bandwidth setting last used in **BP** filter but allows independent variation of the two center frequencies.
  - 3 The **CW** filter has an optional jumper-programmable sidetone filter.
  - 4 The **SSB** filter has its lower cutoff frequency limited to 175 Hz.
  - 5 The multiple automatic notch has four levels of aggressiveness.
  - 6 The random noise reduction has a variable level of noise reduction.
  - 7 All FIR and IIR filter attenuation is indicated in dB @ a distance in Hz outside the passband. All LMS filter attenuation is dependent on the characteristics of the noise.
- All FIR filters are linear phase with a 23 mS time delay and have the upper cutoff frequency limited to 3900 Hz.

FIR - Finite Impulse Response    IIR - Infinite Impulse Response    LMS - Least Mean Square

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

**MFJ ENTERPRISES, INC.**  
**STARKVILLE, MS USA**

- 1 - TNC XMIT AUDIO
- 2 - GROUND
- 3 - PTT
- 4 - RECEIVE AUDIO IN
- 5 - T/R



**Back panel layout of the MFJ-784B. Normal SWL and ham operations need only use the speaker out and receive audio in jacks. 5 pin DIN jacks are for use with a TNC for HF Packet work. Courtesy: MFJ Enterprises**

The 784B also has a "Talk" feature which "...tells you filter settings by sending them over the audio outputs and by flashing them on the LEDs in Morse code." Heck, you don't even have to connect this filter to a radio to have hours of fun just chatting with the unit itself! You can even use the internal jumpers to change the pitch and speed of the Morse code talk feature.

## ■ Last Word

For a comparison, I set aside the Kenwood transceiver and dug out my Uniden 2021 short-

wave receiver and hooked it into the 784B. With just the telescopic whip for an antenna, I was able to tune in some pretty good DX, and, adjusting the BFO, catch a lot of CW action as well as tuning into clear digital modes. It didn't make the 2021 perform like the Kenwood but it certainly enhanced its capabilities.

As great as it is, the MFJ-784B can't compensate for a poor antenna, unfavorable propagation, fading, or static crashes. In short, it can't do the impossible. Between the effects of Nature and the actions of Man, the state of the HF spectrum tends to chaos.

There are a number of things which you can do to make any listening experience better and maximizing the DSP results:

- use a low noise antenna;
- go through the house and turn off any appliance guilty of adding hash to your reception (dimmer switches, TV sets, computers, VCRs, hair dryers, vacuum cleaners and sewing machines); and,
- locate your antenna, if possible, away from leaky power line transformers.

I thoroughly enjoyed operating in the ham bands with the MFJ-784B. It was a treat to make tuner-uppers disappear with the flick of a switch: "poof" they're gone. Most satisfactory!

It was exciting to turn the filter switch to SSTV/FAX/WeFAX and get rid of adjacent channel interference often responsible for weird artifacts in this type of reception. About the only thing I couldn't do was cut the jamming on Radio Marti, but, maybe with a little more tweaking I could do that, too!

[The MFJ-784B is available through most amateur radio supply houses or directly through MFJ Enterprises, Inc. 300 Industrial Park Road, Starkville, MS 39759 Phone: 601-323-5869 FAX: 601-323-6551 or visit their web site at [www.mfjenterprises.com](http://www.mfjenterprises.com) ]

## IT'S BACK AND BETTER THAN EVER

### The Worldwide Shortwave Listening Guide

Edited by John Figliozi

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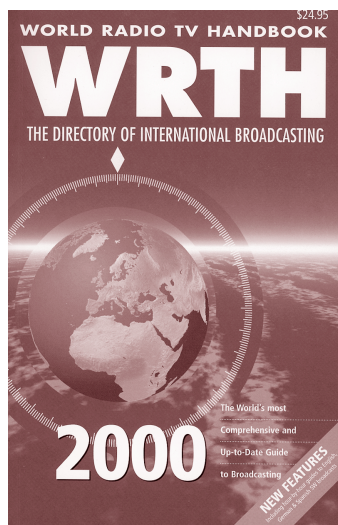
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## WRTH 2000: The Debate Continues

*World Radio TV Handbook*, published by WRTH Publications Ltd and edited by David Bobbet, has recently released its 54<sup>th</sup> Volume, but hobbyists around the world have reported some disappointment. Touting its supposedly new and expanded edition, *WRTH* begins with 22 pages of equipment reviews, followed by an article on space weather that offers background into geophysical and solar parameters, plus expected HF conditions for the year. Slick colored maps indicating transmitter sites are included in this edition; snazzy maps do dress up the pages, but will they make you a better DXer?



No doubt the most glaring complaint remains the National Radio section. Arranged within 320 pages of alphabetical country listings, each is then subdivided into longwave, medium wave, shortwave and FM. Unfortunately, the international broadcast schedules are shown in a separate section, again by alphabetical country. Wouldn't it be more advantageous to the listener to arrange both national and international information under each country (sorted by

continent), instead of having to flip constantly from the national section to the international section?

Because of publishing deadline requirements, only partial winter broadcast schedules for 2000 can be included, and they represent usage only to March 2000. This remains a problem for all annual publications. How accurate can your frequencies remain, if shortly they are out of date? A hobbyist's only alternative is to obtain seasonal frequency changes either by monitoring throughout the year, club bulletins, collecting station schedules, or through the pages of *Monitoring Times*.

Much to chagrin of DXers, the lack of the frequency listings for regional shortwave broadcasters remains; according to the editor, this was the result of apparent "last minute technical difficulties." A 32 page, printable supplement is available at the *WRTH* website <[www.wrth.com](http://www.wrth.com)>.

Despite these glaring shortcomings, at \$24.95 *WRTH* continues to offer an enormous amount of information that is not available from other radio books. Admittedly, no publication can be 100 percent accurate throughout the year. Despite the complaints of inaccuracy, typos, and a general malaise among radio enthusiasts, *WRTH* offers the listening world a manual that should continue to be among the DXer's listening post references – not in the fireplace! It's up to the hobbyist to keep his data up to date, not demand the impossible.

– Gayle Van Horn

## Write On!

In a hobby that spans the world, it's easy to understand the fascination of hams and radio hobbyists for maps. Especially big maps!

You can't get much bigger than the 9-ft by 13-ft wall mural sold by Hammacher Schlemmer. This accurately-detailed, eight-color map was originally pub-



lished under the direction of the US Department of Defense and the CIA. Current as of June 1998, it includes capitals, countries, major cities, political boundaries, time zones, shipping lanes, nautical miles, ocean depths, elevations and more – all clearly indicated at a scale of 160 statute miles to the inch.

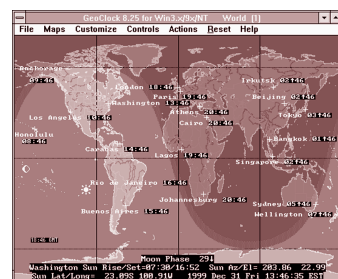
Best of all if you can afford the steeper price, it comes with a laminated surface that can be written on over and over with a dry-erase marker (included) – a DXer's dream. Record the path, date, and distance of memorable DX catches or contacts. Note active frequencies for shortwave broadcasters. Track aircraft visually as you monitor their communications. Note amateur radio country callsign prefixes so you can identify the origin of ham radio communications at a glance.

The mural is eight separate panels of 80-lb. paper stock that can be hung as one piece or individually. The erasable mural is \$124.95; the same map without lamination is \$69.95. For more information or to order, contact Hammacher Schlemmer at [www.hammacher.com](http://www.hammacher.com) or call 800-543-3366 (513-860-3397 if overseas).

## GeoClock

Joe Ahlgren authors probably the premier mapping program showing Earth's terminator line and the positions of the sun and the moon. The DOS and Windows (no Macintosh, unfortunately) shareware programs support EGA, VGA and SVGA video modes.

It is a marvelous program for the DXer. The "pro" version has several hundred additional maps at increasingly larger scales. A "ham radio" module, including a custom map centered on your location, is also available. Program and map upgrades are free to registered users. Registration: basic, US\$35; pro, US\$75.



In December, Ahlgren changed the address for his Web site. Simply enter [www.geoclock.com/](http://www.geoclock.com/) and it will take you to <http://home.att.net/~geoclock/>. Other contact information: GeoClock, 2218 N Tuckahoe St, Arlington VA 22205, USA; voice 703-241-2661, FAX 703-241-5809, E-mail [joe@geoclock.com](mailto:joe@geoclock.com) – Tom Sundstrom

## ScanCat Gold Ver 7.5.8

Jim Springer just can't quit! The most recent release of ScanCat Gold now supports Radio Shack's new PRO2052 scanner as well as the BC-245/895 TrunkTrackers – for a total of 85 radios from over 10 manufacturers. No need to buy several programs, one for each radio you own. All the equipment is supported in one program, no need to purchase separate "drivers."

ScanCat's trunk-following support permits you to selectively load the banks of the radio with all your favorite trunking frequencies and trunking group ID numbers. Of course ScanCat can also read the radio's memory contents to files, including conventional trunking information.



## Anticipation ...

Two years ago, when there was talk of a new receiver called the BC-780XLT, Uniden denied any such model was under development. Now, although buyers still must wait for a June or July release date, a mock-up of the Uniden BC-780XLT was on display at the winter Consumer Electronics Show 2000. Here are some anticipated features.

Also known as a TrunkTracker III (it will include LTR trunking as well as Motorola and Ericsson trunking) the radio will perform multiple trunk system tracking at the same time and, like the BC-245, it will trunk and conventional scan at the same time. There will be no 5-second delay, says Richard Barnett.

The BC-780XLT will be a mobile/base scanner (approx. 7" long by 2.75" high) with a flip-up stand for base use. Keys are fully back-

lit; the display will show five lines of alpha/numeric information.

Frequency range is expected to be 25-512 continuous plus 806-1300 continuous less cellular. Frequencies are stored in 10 banks of 50 channels each. Trunk following for Motorola 800/900 systems will use control channel trunking. Other features may include CTCSS/DCS operation, signal strength meter, selectable AM/FM/WFM modes, cloning, PC control, SmartScanner downloads, SAME weather alert, 10 preprogrammable service searches, reverse key (to instantly switch to repeater input of standard UHF/800/Ham freqs), and beep alert on user-selected channels/talkgroups.

Remember, the software is still being developed and some features may not make it into final production. The suggested retail price given at the first of the year was \$379.99.

Other features added to this latest program include auto logging (with duplicate check) of all talk-groups as they become active, a "tabbed" database specifically designed to enable bank by bank loading of conventional and trunked frequencies and talk group IDs, user-selectable colors for instant visual identification of service, sort on any field in ascending or descending order, and export to comma delimited files.

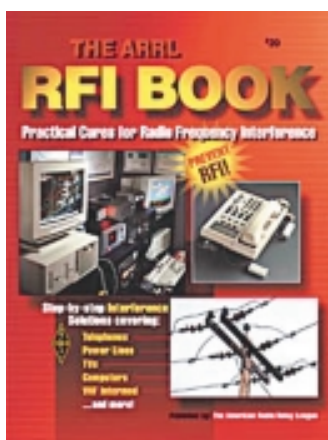


Icom PCR owners may also be interested to know that Scancat-Gold increases the viewing bandwidth on the PCR1000 and PCR100 bandscopes from 200 kHz to over 500 kHz. ScanCat Gold for Windows by is \$99.95 from Grove Enterprises (800-438-8155) or directly from Computer Aided Technologies at 888-SCANCAT. Visit [www.scancat.com](http://www.scancat.com) for more information.

## The ARRL RFI Book

With the new amateur license structure going into effect April 15th, the following scenario could

become more common than we care to think: "Joe Hamm has just passed his FCC examination and awaits the arrival of his ticket so he can have his first amateur contact. The big day finally arrives and Joe rushes into his newly assembled station to make use of the privileges he has worked so hard to earn. After about an hour, he finally gets over his initial nervousness and establishes contact with another ham – in Ireland! After about 15 minutes of excited conversation, Joe hears a loud knock on his door." ... It's an irate neighbor, of course.



What to do about radio frequency interference is the topic of this Amateur Radio Relay League book, written in understandable language, using humor and commonsense solutions. The book's 300+ pages compile the best advice available on every type of interference; if it's a device that can be affected by interference, including your station receiver, you'll find practical cures – most of them quite inexpensive. Information is also provided on FCC regulations, the ham's legal responsibilities, and ways of cooperating with your neighbor to resolve the situation.

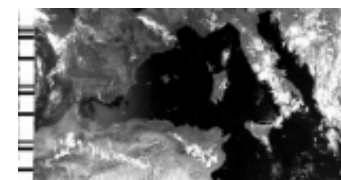
To order the \$20 *ARRL RFI Book*, call or write the ARRL headquarters at Newington, CT 06111-1494; in the US, call toll-free 1-888-277-5289; outside the US, call +1-860-594-0355; or order online at [www.arrl.org](http://www.arrl.org)

## Decoding Shareware

Brian E. Cauchi, 9H1JS, is an amateur radio operator from the island of Malta who has written a decoding program that works with Soundblaster compatible sound cards. FTV can be used to receive images from weather satellites and terrestrial facsimile stations, text transmissions from radio telex services, and amateur radio FAX, SSTV, RTTY and CW (Morse code) signals. It can also transmit amateur radio FAX and SSTV.



No external hardware, other than a radio, is required, as all the necessary signal processing is implemented in the software. Signal analysis is available in all modes, and many parameters may be adjusted while receiving. You may work on one image while receiving another. A realtime spectrum analyzer may be added to the tuning scope.



Interested users can download an unregistered version which works just like the registered one, except that image saving and CW/RTTY logging are disabled. If you register your copy of the software you support the continued evolution of the program, and you are entitled to free upgrades when newer versions are released. Registration is US\$25.



For more information, visit FTV's website at <http://jump.to/ftv> or write to Brian E. Cauchi, Gawhra, Domenico Cachia Street, Birkirkara BKR06 MALTA (Europe)

## 2000 Police Call on CD-ROM

For the scanner hobbyist who travels throughout the U.S., *Police Call* on CD-ROM is almost a necessity. All the information from the entire nine-volume *Police Call* set is packed into one powerful CD, divided into three sections: Guides, Police Call, and Beyond Police Call.



The heart of the CD is the frequency database. *2000 Police Call* features over a half million frequency listings including police and fire, business and industry, hospital and ambulance, public utilities and transportation, sports and entertainment, aviation and railroads, and much more! The 2000 edition now also includes talk group ID codes for trunked system monitoring. You may sort by state, by frequency, by US government agency, by trunked systems, or you may search the database using any data field.

This first CD-ROM isn't without a number of bugs, however. The most glaring problem comes when you want to customize your own data base for home use or perhaps to create a file to preprogram your scanner

for your next trip. Currently, the data must be exported to another database in order to be manipulated, due to improper or missing drop-down commands. Since the documentation is poor, the user is left in the dark about whether he is using the software incorrectly or if it is a software problem.

A patch which resolves most of the problems in the Personal Database has been posted at Pozilla Software's website, though at this writing there is mention of problems and no link to it from the [www.policecall.com](http://www.policecall.com) website. Go to [www.mghusa.com/pozilla/pcannounce.htm](http://www.mghusa.com/pozilla/pcannounce.htm) to download the patch.

The CD contains the usual FCC frequency allocation tables, but these have not been updated to reflect refarming changes, even though the database itself does include the new frequency splits. Other chapters include "ten" codes, an excellent chapter on technical scanner topics, maps, and a listener's glossary.

The entire nationwide set on CD-ROM is \$34.95 from dealers nationwide, including Grove Enterprises (800-438-8155 or [order@grove-ent.com](mailto:order@grove-ent.com)).

## Business and Product News

- Ericsson Inc. announced in January that it is selling its Private Radio Systems operations to Com-Net Critical Communications, a Pittsburgh, Pennsylvania-based provider of radio network solutions to the public safety and service market.

Ericsson plans to concentrate on the convergence of mobility and internet communications.

- The dynamic range of the WinRadio WR1550 is approximately 71 dB, that's 6 dB better than the former WR1500. Dynamic range means the range of signal strengths (very weak to very strong) that the radio can handle without losing the weakest signal or getting interference

from strong signals.

- The supply of Icom R9000 receivers has been depleted and the R9000 is now officially discontinued.

### Watkins-Johnson

Whereas in December the future name and organizational structure of the Watkins-Johnson Telecommunications Group, manufacturers of the now-discontinued HF-1000 high-end communications receiver, was unclear, there was clarity after the New Year.

The new Web page states "Formerly Watkins-Johnson Company's Telecommunications Group, the Gaithersburg Operations is now a business unit within the Aerospace Electronics sector of BAE SYSTEMS. The facility specializes in radio frequency (RF) electronic products, offering innovative state-of-the-art equipment for applications in communications surveillance, direction finding, and signal processing."

The business unit name is named "SigIntell." BAE Systems Aerospace Electronics, with more than 100,000 employees, is headquartered in Lansdale, Pennsylvania, a suburb of Philadelphia.

The Gaithersburg postal address and telephone number is: BAE SYSTEMS  
700 Quince Orchard Road  
Gaithersburg, MD 20878, USA  
Phone: (301) 948-7550

The Web site URL is now <http://www.sigintell.com/ssi/>. Compared to the Watkins-Johnson pages, this site has a completely new look to it, including a fill-in-the-request-form for product information. The data sheet for the WJ-8711A receiver, upon which the HF-1000 was based, is located at [http://www.sigintell.com/web/owa/internet\\_siteview\\_page?p\\_page\\_id=161](http://www.sigintell.com/web/owa/internet_siteview_page?p_page_id=161). Each catalog page's menu allows the customer to quickly select from all the receivers in the product line-up.

— Thomas R. Sundstrom, W2XQ

### Waiting for Grundig...

The long-awaited Grundig Satellit 800 quasi-portable receiver, a joint engineering project between Lextronix (<http://www.grundigradio.net/>) and R.L. Drake Company, was delayed once again in early 2000. Originally scheduled for shipment to dealers in mid-December, deliveries were postponed until March. A Lextronix spokesperson was not able to specify a date or the beginning, middle or end of the month. The reason for the delay was described as the desire to make further engineering refinements to the radio and a halt to work in China for the extensive Chinese New Year celebration.

Further, the spokesperson responded to our inquiry about the rumors, circulating via the Internet mailing lists and newsgroups, that the Satellit 800 is merely a repackaged Drake SW8. This is not the case, and the spokesman pointed out there were substantial differences in the audio section, including an audio section capable of 20-watt peak output power and stereo line-level outputs.

— Tom Sundstrom, W2XQ

**Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or e-mailed to [mteditor@grove-ent.com](mailto:mteditor@grove-ent.com).**

# CCRadio vs. Superadio... How do they stack up?

Review by Bob Grove

**M**edium wave (standard AM broadcast band) DXing (long-distance listening) is a specialized hobby, separate from shortwave listening. General coverage communications receivers, perfectly acceptable for the SW listener, commonly attenuate their sensitivity in the MW band to avoid the consequences of local strong-signal overload, and loop antennas are often invoked to reject ambient electrical noise or null interference from co-channel broadcasters.

Off-the-shelf consumer radios are hardly adequate for the hard-core MW DXer; they suffer the maladies of poor sensitivity, broad selectivity, imaging, strong-signal overload, and dismal frequency accuracy. And, just for kicks, they rarely allow the use of an external antenna.



*The GE utilizes the time-honored, but inferior, slide rule dial.*

For many years a popular favorite among MW DXers was a Radio Shack receiver with TRF (tuned radio frequency) design; it was a hot receiver, and many aficionados were disappointed when the product was discontinued.

More recently, the GE series of Superadios, now in their third generation, have been accepted as the standard of comparison for medium wave broadcast listeners, primarily because of their legendary IF (intermediate frequency) filtering. Now there is a new kid on the block: the CCRadio, made by Sangean under contract with C. Crane Co. of Fortuna, CA, and reviewed in *MT* Feb 1999.

Is the CC hype louder than its performance, or is this newer model a serious threat to the GE's lofty position? At nearly three times the price of the GE (\$159.95 vs. \$59.95), does the CC offer that much more? Let's take a quick overview of their cosmetics and features, then a more discerning look at their relative performances under actual listening conditions.

The smaller CC (11"W x 6-3/4"H x 3-1/2"D) is finished in charcoal gray matte, while the larger GE (13"W x 9"H x 3-1/2"D) exhibits a glossier black and chrome highlighting. Both radios offer separate bass and treble tone controls, headphone jack, telescoping whip (longer on the GE), and dual AC/battery power supply. Both provide screw



reception on the GE. Weather band reception on the CC was roughly equivalent to that of a hand-held scanner, remarkable for a multiband portable. Reception on this range is undoubtedly helped by the frequency-resonant 16" whip antenna.

## Selectivity

The ability of a receiver to reject interference from adjacent channels stations is critical to AM DXers. While the GE offers two selectivity choices, the wide is unjustifiably broad given the poor fidelity common on medium wave; as a result, only the stronger signals will be heard with that selection, swamping weak, adjacent-channel broadcasters. The narrow position certainly improves adjacent channel selectivity, but does not compare to the sharp skirts and ultimate attenuation of the CC's filters.

On the other hand, using the internal AM loop antenna to null interference is much sharper on

terminals for an external AM antenna (the GE also includes terminals for FM), a top-cabinet push/push power switch, and a right-side-mounted tuning dial. But that's where the similarity ends.

## Tuning Dial

The GE sports a traditional analog slide-rule dial, while the CC offers a backlit LCD which has an alarm clock/sleep function and 20 memory channels (5 in each of 4 bands) in addition to its mandatory frequency display.

The accurate and informative LCD wins hands down over the old analog dial with its loose calibration. The GE offers automatic frequency tuning (AFC) on its FM mode, required in older variable frequency oscillator (VFO) designs to prevent tuning drift. The CC, being frequency synthesized and utilizing phase locked loop (PLL) drift cancellation, does not require such compensatory circuitry.

Like modern automotive radios, an up/down autoseek feature searches out signals at the press of a key.

While the GE offers conventional AM/FM coverage (530-1700 kHz/88-108 MHz), the CC adds seven weather channels (162.400-162.550 MHz) with severe conditions alarm, and TV audio for channels 2-13.

## Audio Quality

This one is a little tricky. The CC is admittedly designed for talk radio, so its IF and audio filtering are contoured to favor the more limited range of voice frequencies. The GE does a much better job on music with its choice of wide/narrow filters and separate, larger woofer/tweeter speaker system in a larger enclosure.

Although the printed specifications show the CC's audio output rated at 1.8 watts for 10% THD (total harmonic distortion) versus the GE's 700 milliwatts (unspecified THD), both radios deliver approximately the same acoustic sound levels before going into distortion.

While the sound of the GE on music is more transparent with richer bass and crisper highs, the CC music performance is certainly listenable, but clearly favors the human voice. Both sets offer considerable tonal equalization with their bass and treble controls.

## Sensitivity

We noticed no remarkable difference in either AM or FM sensitivity between the two sets, although other observers report slightly better weak AM signal



*A large digital display provides more accurate frequency readout.*

the GE, and at nighttime, image interference from 60 meter (5 MHz band) shortwave signals are quite prominent on the CCRadio using its own whip.

## The Bottom Line

If you require a portable with good fidelity, excellent adjacent channel AM selectivity, and favor listening to distant talk radio in crowded band conditions, the CCRadio is a clear choice, and tosses in weather band and TV audio as well.

If you are looking for a more economical AM/FM radio with better-than-average performance and outstanding music quality, the GE Superadio III should prove quite satisfactory.

CCRadio, \$159.95 plus shipping from C Crane Company, 558 10<sup>th</sup> St., Fortuna, CA 95540-2350; ph. (800) 522-8863.

GE Superadio III, available from *MT* advertisers including Grove Enterprises, PO Box 98, Brasstown, NC 28902; ph. (800) 438-8155 (Price \$59.95 plus \$5.95 shipping).

Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.  
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## EDITORIAL STAFF

Correspondence to columnists may be mailed c/o Monitoring Times; any request for a reply should include an SASE.

Frequency Manager .....	Gayle Van Horn .....	<a href="mailto:gayle@webworkz.com">gayle@webworkz.com</a>
Frequency Monitors .....	Mark J. Fine .....	<a href="mailto:fineware@erols.com">fineware@erols.com</a>
	Dan Roberts	
Program Manager .....	Jim Frimmel .....	<a href="mailto:frimmel@star-telegram.com">frimmel@star-telegram.com</a>
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By Bob Grove,  
Publisher

## ABOLISH MORSE CODE BEFORE IT'S TOO LATE!

### Some Fond Memories and Some Harsh Pragmatics

There, that ought to rile the "Morse Forever" constituents among our readership! At least it got your attention. The Federal Communications Commission's restructuring of the amateur radio service is now official, and I expect it to breathe new life into our hobby. With its implementation and the reduction of the Morse speed requirement, I will probably upgrade from my Advanced Class license to Extra.

But before I say any more, I think I should make my own position on Morse code completely clear. While I haven't used it in years, there were times when I did. Studying for my Novice test in 1951 was exciting. Getting on the air with a straight key gave me endless hours of recreation and edification, both with the local club members who encouraged me to stick with it, and the hundreds of new acquaintances I was making on the air.

I can recall with fondness the reassuring click of the keying relay as I sent my dots and dashes; the faint tones of a distant reply in the background of static; the pulses of blue light in the 6L6 output tube as it tracked my key; the rapid excursions of the plate current meter on my home-brew transmitter; and the cluster of QSL cards growing around my wall. It was a magical time, a good time, a simple time. But I longed to talk – really talk – with other hams whom I heard on the bands.

Nothing can compare to the sound of a human voice, whether it is in person or through a piece of electronic equipment. The reassurance is primordial, one of the most human of experiences, a true connection. The sound of a friendly human voice in the unknown darkness is as consoling to an adult as it is to an infant. Somehow "BEEP-BEEP-BEEEEEP" can't quite compare!

Although Morse is not my cup of tea, I acknowledge its allure to some. Just as many experimenters enjoy listening for strange sounds from distant space, the Morse operator enjoys the simple technology of communicating via key, the sweet tone in the earphones; he enjoys recognizing the "fist" that characterizes the individuality of different operators. That's his choice – and that's the point. But Morse has been fancifully exalted to a lofty position far beyond what it deserves.

Over the years, the American Radio Relay League (ARRL), which presumes to represent amateur radio in the United States, has steadfastly lobbied for the perpetuation of Morse code proficiency as a requirement for ham licensing. Largely due to their historical influence, Morse code competence below 30 MHz remains a stipulation of international regulations (probably soon to be repealed as other, more enlightened, international representatives rally against this obsolete requirement).

For decades League members and officers have held on to the indefensible position that somehow this right of passage, the passing of the Morse code test, makes better operators. If this is true, then we should see exemplary operating habits and character among the

licensees who passed the code test as compared with those from the only class that doesn't require it, the Technicians.

Since there are twice as many Technician class licensees as any one of the Morse-proficient classes (Tech Plus, General, Advanced, Extra), we should expect to see substantially more FCC citations issued against the Techs. Let's take a look at the ARRL's own Web site which reports such violations ([www.arrl.org](http://www.arrl.org) - FCC Amateur Radio Enforcement).

A quick review of six month's worth of FCC citations for poor operating practices, deliberate and malicious interference with other licensees and services, improprieties in testing procedures, falsifying license applications, out-of-band and over-powered transmissions, and other rules violation, was most revealing.

Of those licensees who had their licenses suspended, revoked, or under review for deliberately or maliciously disrupting legitimate communications – playing music, keying on and off, hurling obscenities and profanities, noisemaking, and other infantile rudeness – 85% had passed their Morse code tests.

And of those licensees cited for lying on official FCC documents, or falsifying call sign applications for non-existent clubs, or taking part in illegitimate testing sessions, 91% were certified as code proficient, with the largest representation – surprise – the exalted Extra Class licensee!

Clearly, a case could be made for the concept that proficiency in Morse code is a detriment, not an asset to amateur radio, and should be judiciously avoided! The unfairly maligned Technicians have been a boon to the amateur radio corps. Their spirit, good will, enthusiasm, youthful ideas, and lawful operation remarkably parallel the early days of radio and stand in stark contrast to the repellant example being set by the Morse-proficient set.

The contrast must also have been evident to some Extras with a unique tie to aspiring hams – the Volunteer Examiner Coordinators who administer the licensing exams. The National Conference of VECs proposed the restructuring plan that was eventually adopted by the FCC: a plan that encourages participation by new operators and may be the only progressive move that can save amateur radio from extinction.

I don't think it's too late for ham radio, just so long as the Commission's new light, Special Counsel Riley Hollingsworth, K4ZDH, continues to cite and prosecute the malignant elements of our hobby who contribute to their own demise. In addition, I hope the Commission continues to invoke methods to streamline the entrance of prospective hams into our hobby and I commend those amateurs who have aided the process.

*Monitoring Times* goes on record fully supporting and applauding the vigorous, new amateur radio enforcement efforts of the FCC, and repudiates the absurd notion that proficiency in Morse code is a gauge to the character or competence of a licensee.



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